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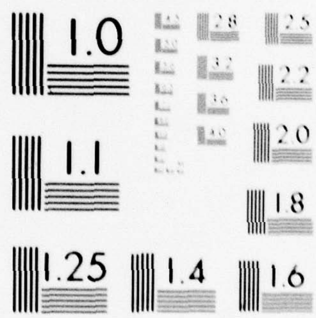

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Marine Seismic Refraction Data Between Wainwright Inlet and Prudhoe Bay, Alaska

By

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The tectonic history of the Arctic Ocean Basin, and in particular the Canada Basin and the adjoining Beaufort Sea shelf, today remains unclear even after decades of geological and geophysical investigations. Reconstruction of the tectonic history of the margin requires information about the deep crustal structure of northern Alaska at the Beaufort Sea. In 1975 and 1976 a substantial amount of refraction data was successfully collected on the Alaskan shelf from an icebreaker. This technical report contains a detailed description cont.

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We express our sincere appreciation to Captain Gillett, the officers and crew of the USCGC GLACIER in 1975 and to Captain Fournier, the officers and crew of the USCGC BURTON ISLAND in 1976 for their assistance and cooperation during data gathering at sea under difficult arctic conditions. We appreciate the use of the facilities at the Naval Arctic Research Laboratories at Barrow and assistance from laboratory personnel under the direction of Dr. Warren Denner for invaluable help with logistics. LCDR Bill Vinson directed and assisted in the essential helicopter operations.

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TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

The tectonic history of the Arctic Ocean Basin, and in particular the Canada Basin and the adjoining Beaufort Sea shelf, today remains unclear even after decades of geological and geophysical investigations. Reconstruction of the tectonic history of the margin requires information about the deep crustal structure of northern Alaska at the Beaufort Sea. In 1975 and 1976 a substantial amount of refraction data was successfully collected on the Alaskan shelf from an icebreaker. This technical report contains a detailed description of the methods and techniques used in the data collection and analysis. Interpretation of the data is the subject of articles to be submitted to professional journals.

DATA ACQUISITION

Location

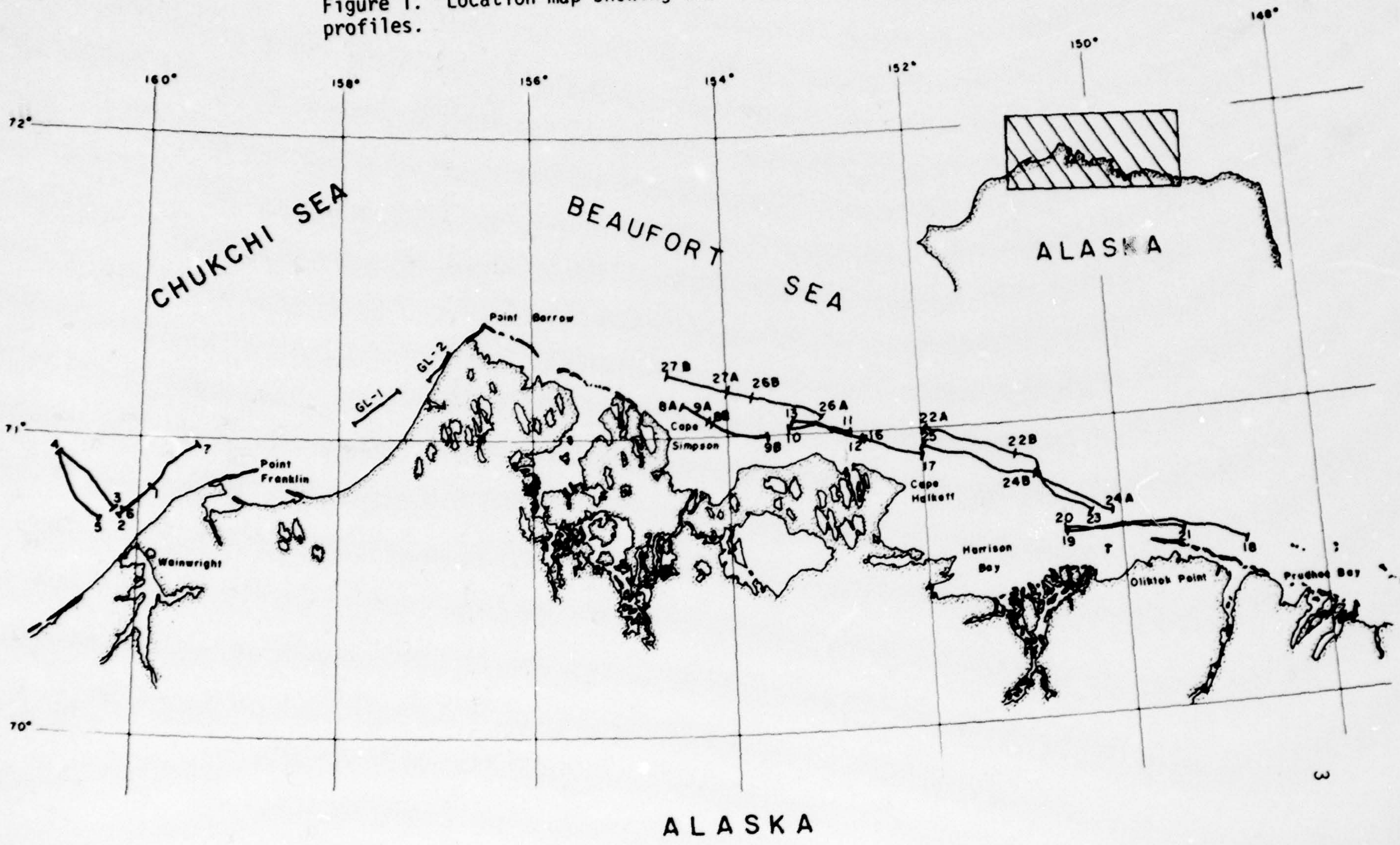
Personnel from Oregon State University and the University of Connecticut conducted marine refraction studies in the eastern Chuckchi Sea and the western Beaufort Sea to obtain structural and velocity information on the continental margin. In contrast to most previous refraction studies in the region which were made from stations located on the ice, these data were obtained using standard marine seismic techniques during the Arctic Summer. Nineteen profiles were obtained between Wainwright Inlet and Prudhoe Bay in August 1975 from the USCG icebreaker Glacier and in August 1976 from the USCG icebreaker Burton Island with helicopter support. The profiles, ranging in length from 13 to 75 km, were roughly parallel to the coastline in about 20 m of water. Heavy ice cover forced many minor course changes and is the reason for the non-linear direction of individual profiles shown in Figure 1.

Techniques

A zone of ice-free or semi ice-free water exists along the northern continental shelf area out to a depth of approximately 2000 meters during one month of the year, and existence of this zone permitted operation of standard marine refraction techniques with sonobuoys and explosive charges.

The lines were shot in the standard marine fashion by dropping charges in the water from the fantail of the icebreaker, using powder fuses and tilt table, while the ship was underway. Rotor-mounted yagi antennas received the sonobuoy signals which were recorded on a 4-channel tape recorder. Two of the four channels were sonobuoy signals, one was

Figure 1. Location map showing the locations of seismic refraction profiles.

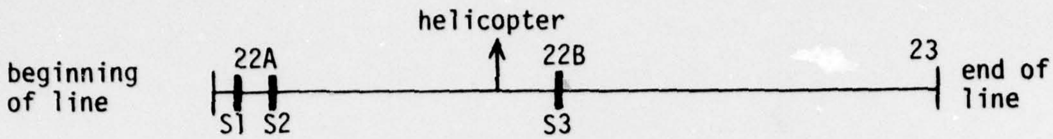


a clock signal and one was a shot-break signal from a streamer 3 m long which was towed close behind the ship. When radio contact with the sonobuoys was lost, at a distance of about 30 km because of earth curvature, a portable recording unit consisting of a radio receiver, an amplifier, and strip-chart and tape recorders installed in a helicopter, monitored the sonobuoy. The helicopter remained within radio reception range of the sonobuoy during the shooting.

Expendable naval sonobuoys of the type AN/SSQ 41A were modified for extended time operation by addition of dry-cell batteries which worked well in spite of the cold water. Explosive charges of less than 10 pounds were made up of nitro-carbonitrate (Nitromon) in one pound metal cans. Explosive charges between 30 and 660 pounds were made up of Tovex in 30 pound plastic bags. Extra boosters (Dupont HDP-1) were required for large charges or for long burn times in order to insure complete detonation in the cold water.

Shots were detonated every three minutes at a ship speed of 10 kt which was slightly variable because of ice conditions. This resulted in a shot spacing of about 0.7 km. During the helicopter operations, shots were detonated at intervals of from 5 to 15 minutes resulting in a shot spacing of 1.4 to 4.3 km.

Sonobuoy deployments consisted of two sonobuoys (S1, S2) dropped at the beginning of each line and an intermediate sonobuoy (S3) deployed in the middle of long lines. This resulted in a special line numbering with letter A for the first sonobuoys and letter B for the intermediate one (for example, Lines 22A-23 and 22B-23)



The satellite navigation equipment was inoperative during the second half of the experiment, therefore most of the navigation was by radar fixes to land points at 15 minute intervals. The ice coverage ranged from 0 to 8 octas during the course of the experiment and required frequent course changes and caution on the part of the shooter not to drop the charge onto pieces of floating ice.

Sea-surface currents were not negligible and affected sonobuoy drift. The direction and magnitude of the drift was estimated by combining water wave travel time and navigation. The in-line component of drift ranged from 0 to 1.65 m/s and was quite variable from line to line.

DATA REDUCTION

A combination of manual and computer-aided manipulations shown in the flow chart of Figure 2 transform the raw data to record sections and velocity-depth profiles.

Arrival times for ground and water waves picked on each seismogram and other information such as bathymetry, ship velocity and streamer length, constitute an input data file for computer program TIMCORM. This program computes corrected ground and water wave arrival times to a datum, making corrections for the shot instant due to separation of shot and streamer and surface and bottom corrections at receiver and shot.

These results form an input file for the computer program REFPLTT which produces a travel time plot with the corrected arrival times of the ground waves at the distances calculated from corrected water wave arrival times. A first attempt is then made to interpret seismic velocities and the data examined for possible errors.

From the corrected output file obtained from program TIMCORM, the computer program REDPLOT2 produces a reduced time plot where arrival times reduced with a velocity of 5.00 km/s are plotted versus distance

A profile which includes some helicopter refraction data requires an additional routine. A data file is prepared from the ship navigation as an input to computer program UTMSTEVE and its two subroutine programs UTMGRIDB and UTM. These programs plot the navigation data on a Universal Transverse Mercator projection. Shot positions are added manually by interpolating time and arcs are drawn using a compass at a radius corresponding to the water wave travel time. Sonobuoy drift due to wind and currents appears as a non-coincidence of the arcs. A drift rate

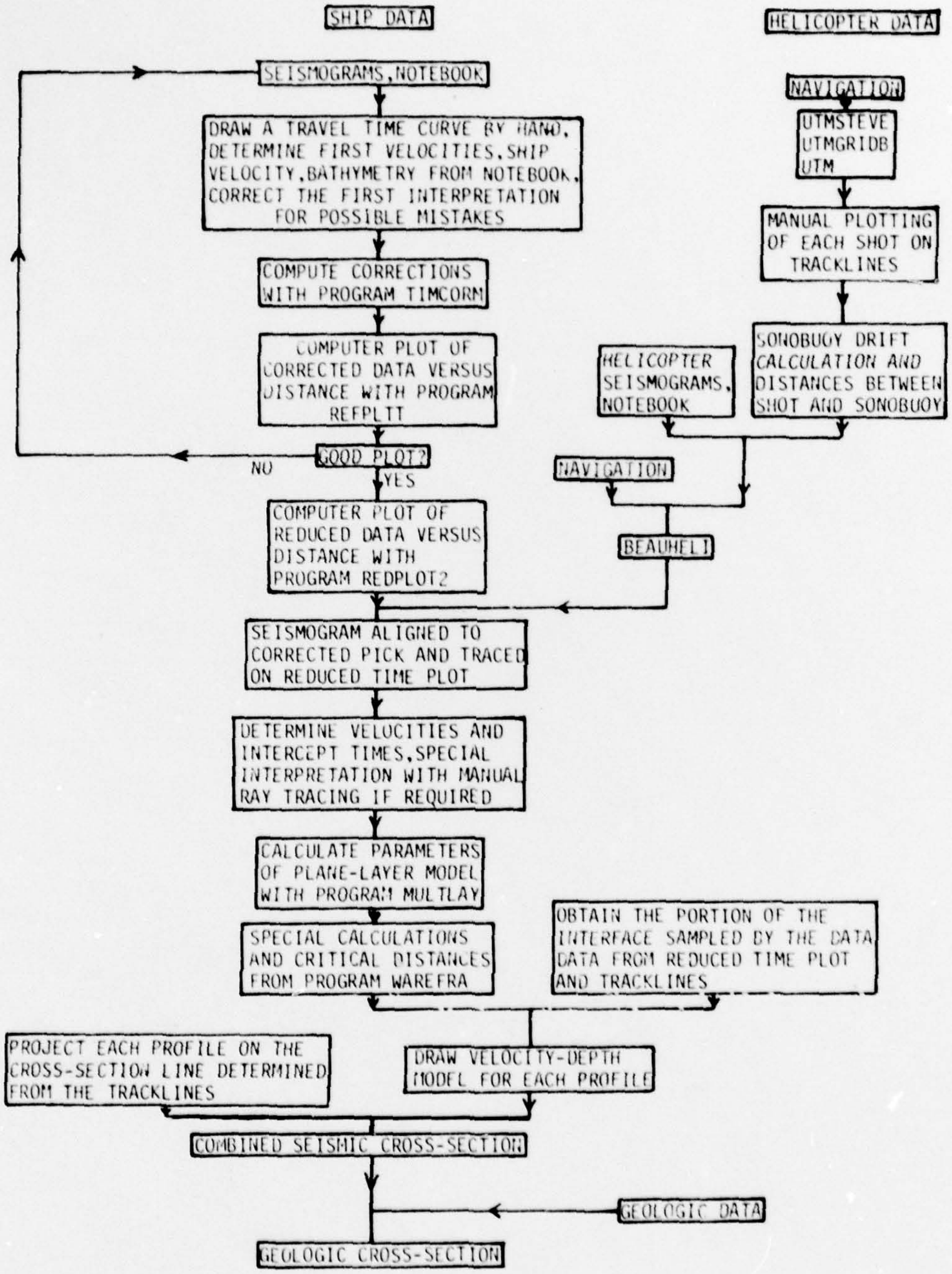


Figure 2. Flow chart of data analysis.

parallel to the trackline is assumed to apply to more distant shots where water wave arrival times may not be detected by the sonobuoy. The shot distance is then the distance between the shot location and the drift position of the sonobuoy at the time of the shot.

The drift distances between the shot and the sonobuoy and the ground wave arrival times from the helicopter refraction data constitute an input file for program BEAUHELI. Computer program BEAUHELI computes time corrections between the ship and the helicopter clocks, the corrected distance between the shot and the sonobuoy, and the corrected travel time for the ground arrival. The strip chart records played back from the helicopter recorder are then aligned to the corrected ground arrival times as plotted on the reduced time plot and traced to produce the record section.

Apparent velocities and intercept times are obtained from this record section and put into the computer program MULTLAY. The computer program MULTLAY computes a model composed of N dipping plane layers from reversed seismic refraction profile data using the formulation of Adachi (1954). The program requires two sets of apparent velocities and intercept times from single-ended refraction data. Complications such as non-reciprocal data or early intercept times require a manual ray tracing method based on the formulation of Adachi (1954).

On each seismic model obtained from MULTLAY the portion of an interface drafted with heavier lines on Figure 8 through Figure 26 represents only that portion of the layer which gives rise to observable seismograms. The offset distances of the rays are obtained from the program WAREFRA. The computer program WAREFRA is based also on the formulation of Adachi (1954) and requires the seismic model obtained from MULTLAY as an input data file.

For the combined velocity-depth section (Figure 27), each profile was projected onto a straight line drawn through the tracklines.

DATA INTERPRETATION

Because of the navigation difficulties, only five lines were reversed. These lines are Lines 1-2 and 6-7, Lines 3-4 and 4-5, Lines 10-11 and 12-13, Lines 22A-23 and 24B-25, and Lines 24A-25 and 22B-23 where the numbers indicate the end points of the lines (see for example Figures 10 and 11). The nine remaining lines (Lines GL-1, GL-2, 8A-9A, 8B-9B, 16-17, 18-19, 20-21, 26A-27A, 26B-27B) were interpreted as single-ended lines (see for example Figure 19). For complicated lines showing non-reciprocal data or early intercept times, a manual ray tracing method was used (see Figures 16 and 17).

Figures 8 to 26 show the nineteen profile plotted as reduced record sections where the reducing velocity is 5.0 km/s. The distance is plotted as water wave travel time seconds where the water velocity was estimated to be 1.44 km/s. All the velocities are in km/s. The seismic models determined from interpreted reduced sections are composed of plane horizontal or plane dipping layers. These are shown above the record sections with a vertical exaggeration of 3:1. Heavy lines on the refractors indicate the interfaces responsible for observed arrivals and contain the horizontal offsets for upgoing rays. Only the reversed profiles resulted in true velocities, and on all the single-ended profiles apparent velocities are assumed to be true velocities. A few estimated velocities are shown in parentheses.

The composite section shown in Figure 27 summarizes the subsurface velocity and depth information calculated from the refraction data. The heavy lines on the interfaces, corresponding to the observed arrivals as shown in Figures 16 through 26, were projected onto a composite section

which passes through the profiles. The small arrows along each interface correspond to the appropriate refraction lines shown at the top of the figure. The refraction layers from adjacent lines have been correlated on the basis of velocity as indicated in Figure 27 by light lines.

PRESENTATION OF DATA

I

MAP-GENERATING COMPUTER PROGRAMS (UTMSTEVE, UTMGRIDB, UTM)

NAVIGATION LISTING AND

TRACKLINE MAPS

```
UTMSTEVE
      COMPILER DOUBLE PRECISION
C     PROGRAM UTMMAP
C  THIS PROGRAM CALLS UTMGRID TO MAKE AN UNIVERSAL TRANSVERSE
C  MERCATOR GRID.  IT THEN READS AN AEROMAG DATA FILE AND PLOTS
C  EITHER TRACKLINES OR ANNOTATED DATA POINTS ON THE GRID
      COMMON /UTM2/  NLAT, SLAT, ELONG, WLONG
      REAL  LAT, LONG, NLAT, LX, LY, NX, NY, LATM, LONGM
      DIMENSION  NAME (6), IVARI (2), FNAME (6)
C  CONSTANTS FOR THE CALCULATIONS
      PI = 3.1415926536
      PID2 = PI / 2.0
      PID4 = PI / 4.0
      TWOPI = PI + PI
      RTOD = 180. / PI
      DTOR = PI / 180.
      ISIDE = 1
C  GO GET THE GRID PARAMETERS AND DRAW THE GRID
      CALL UTMGRID
      TYPE "ANNOTATE THE DATA PTS"
      READ (11, 101) IANS
  101 FORMAT (A2)
C  SET UP THE INPUT FILE
    5 TYPE "FILENAME"
      READ (11, 102) FNAME (1)
  102 FORMAT (S10)
      CALL FOPEN (1, FNAME)
C  GET A DATA POINT
   10 READ (1, 100, END=20) IVARI, LAT, LATM, LONG, LONGM
  100 FORMAT (7X,2A2,1X,F3.0,1X,F5.0,1X,F4.0,1X,F5.0)
C  CHECK LAT AND LONG FOR WITHIN THE GRID
      LAT = LAT + SIGN (LATM/60., LAT)
      LONG = LONG + SIGN (LONGM/60., LONG)
      IF (LAT .EQ. 0.0) GO TO 10
      IF (LONG .LT. 0.0) LONG = 360. + LONG
      IF (LAT .LT. SLAT .OR. LAT .GT. NLAT) GO TO 10
      IF (LONG .LT. WLONG .OR. LONG .GT. ELONG) GO TO 10
C  CONVERT LAT AND LONG TO UTM X AND Y
      CALL UTM (LAT, LONG, X, Y)
C  IF NO ANNOATAION DON'T NEED THE ANGLES ETC
      IF (IANS .EQ. 2HNO) GO TO 16
C  FIGURE OUT WHERE AND WHAT ANGLE TO ANNOTATE THE DATA POINT
      ISIDE = ISIDE * (-1)
      YMLY = Y - LY
      THETA = ATAN (YMLY / (X-LX))
      LX = X
      LY = Y
      IF (ABS (THETA) .LT. PID4) GO TO 12
      ANGLE = 0.
      NX = X
      IF (ISIDE .LT. 0) NX = NX - 0.3
      NY = Y
      GO TO 13
   12 ANGLE = 270.
      NX = X
      NY = Y
      IF (ISIDE .LT. 0) NY = NY + 0.3
C  LABEL THE DATA POINT
   13 CALL SYMBOL (NX, NY, 0.07, IVARI, ANGLE, 4)
      CALL PLOT (X, Y, 3)
C  PLOT THE DATA POINT
   16 CALL PLOT (X, Y, 2)
      CALL MARKER (1)
      GO TO 10
C  HERE ON EOF
   20 CONTINUE
      CALL FCLOS (1)
C  ANOTHER FILE ONTHIS GRID
      TYPE "ANOTHER FILE"
      READ (11, 101) IFILE
      IF (IFILE .EQ. 2HYE) GO TO 5
      END
```

```
      UTMGRID
      COMPILER DOUBLE PRECISION
      SUBROUTINE  UTMGRID
C  THIS SUBROUTINE DRAWS A UTM MERCATOR GRID ON THE PLOTTER.  IT
C  QUERRIES THE USER FOR THE MAP PARAMETERS AND LEAVES THEM IN
C  COMMON FOR THE CALLING PROGRAM.
C  SOUTHERN LATITUDES AND WESTERN LONGITUDES ARE NEGATIVE.
C  UTMMAP WILL WORK ACROSS BOTH THE DATELINE AND GREENWICH
C  MERIDIAN.
      REAL    MINLAT,  MAXLAT,  MINLONG,  MAXLONG
      COMMON /UTM1/  SCALE, X0, Y0, DTOR, MTOI, A, B, C, LA, LALA,
     1               LESQ, OMLESQ, CMERID, K0
      REAL    LA, LB, LESQ, LALA, MTOI, K0
      REAL    MINLATM, MAXLATM, MINLONGM, MAXLONGM
      REAL    LAT, LONG, MLAT, MIN
      COMMON /UTM2/  NLAT, SLAT, ELONG, WLONG
      DIMENSION ABCD (40)
C  CODES FOR THE PLOTTER SUBROUTINES
      INTEGER  PENUP, PENDOWN, PLOTEND, PEN, ABCD
      PENDOWN = 2
      PENUP = 3
      PLOTEND = -PENUP
C  CONSTANST FOR CALCULATIONS
      DTOR = 3.1415926536 / 180.
      MTOI = 39.37
C  PARAMETERS FOR A UTMGRID
      K0 = 0.9996
      A = 1.0051092
      B = 0.0051202
      C = 0.0000100
      LA = 6378206.4
      LB = 6356583.8
      LALA = LA * LA
      LESQ = (LALA - LB * LB) / LALA
      OMLESQ = 1.0 - LESQ
      X0 = 0.0
      Y0 = 0.0
   10 WRITE (10,100)
C  LONGS WEST ARE NEGATIVE AND LATS SOUTH ARE NEGATIVE
  100 FORMAT ('0GIVE THE FOLLOWING:',/,
     1        '   NLAT   SLAT   WLONG   ELONG    SCALE   GRID',/,
     2        '   D M    D M    D M     D M 1:           M')
      READ (11,101) MAXLAT, MAXLATM, MINLAT, MINLATM,
     1              MINLONG, MINLONGM, MAXLONG, MAXLONGM,
     2              SCALE, MIN
  101 FORMAT (F3.0,1X,F2.0,1X,F3.0,1X,F2.0,1X,F4.0,1X,F2.0,1X,F4.0,
     1        1X,F2.0,4X,F6.0,1X,F4.0)
C  MAKE DECIMAL DEGREES OUT OF THE DEGREES AND MINUTES
      SLAT = MINLAT + SIGN (MINLATM, MINLAT) / 60.
      NLAT = MAXLAT + SIGN (MAXLATM, MAXLAT) / 60.
      WLONG = MINLONG + SIGN (MINLONGM, MINLONG) / 60.
      ELONG = MAXLONG + SIGN (MAXLONGM, MAXLONG) / 60.
      MIN = MIN / 60.
      IF (NLAT .LE. SLAT) GO TO 16
C  MAKE LONGS 0 TO 360 TO THE EAST
      IF (WLONG .LT. 0.) WLONG = 360. + WLONG
      IF (ELONG .LT. 0.) ELONG = 360. + ELONG
C  TAKE CARE OF CROSSING GREENWICH - MAKE LONGS GO TO 720 DEGS
      IF (WLONG .LT. ELONG) GO TO 12
```

```
      ELONG = ELONG + 360
   12 WRITE (10,117)
  117 FORMAT (' PLOTTER READY')
      READ (11,114) IANS
  114 FORMAT (A2)
      IF (IANS .EQ. 2HYE) GO TO 15
      GO TO 10
   16 TYPE "NLAT, SLAT ERROR"
      GO TO 10
   17 TYPE "LONGS NOT WITHIN + OR - 3 DEGREES OF CENTRAL MERIDIAN"
      GO TO 10
   15 CALL FOPEN (6, "$PLT")
C  INITIALIZE THE PLOTTER
      CALL INITIAL (6, 100, -0.5, 22.)
      CALL PLOT (1., 1., PLOTEND)
C  INITIALIZE PEN POSITIONS
      SCALE = 1.0 / SCALE
C  LETS LABEL IT AGAIN WITH INFORMATION CONCERNING THE MAP.
C  AREA, DATA, ETC.
      WRITE  (10,102)
  102 FORMAT ('0GIVE THE PLOT LABEL -- UP TO 80 CHARS ')
      READ (11,103) ABCD
  103 FORMAT (40A2)
      CALL SYMBOL (0.,-1., .21,ABCD,0.,80)
      TEMP = WLONG
      IF (WLONG .GE. 180.) TEMP = WLONG - 360
      IZONE = (TEMP + 186.) / 6
      CMERID = MOD ((IZONE-1) * 6 + 183, 360)
C  NOTE CMERID 0 TO 360 DEGREES TO THE EAST
      IF (DABS (CMERID - WLONG) .GT. 3.) GO TO 17
      IF (DABS (CMERID - ELONG) .GT. 3.) GO TO 17
C  NOW WITHIN + OR - 3 DEGREES OF CMERID
      IF (WLONG .GE. CMERID) CALL UTM (SLAT, WLONG, X, Y)
      IF (ELONG .LE. CMERID) CALL UTM (SLAT, ELONG, X, Y)
      IF (WLONG .LT. CMERID .AND. ELONG .GT. CMERID)
     1 CALL UTM (SLAT, CMERID, X, Y)
      Y0 = Y
C  NOW HAVE MIN Y VALUE (Y0) FOR THE MAP
      IF (WLONG .GT. CMERID) CALL UTM (NLAT, WLONG, X, Y)
      IF (WLONG .LE. CMERID) CALL UTM (SLAT, WLONG, X, Y)
      X0 = X
C  NOW HAVE MIN X VALUE (X0) FOR THE MAP
C  (X0, Y0) ARE THE SOUTH WEST CORNER OF THE MAP SUCH THAT THE GRID
C  DOES NOT GO EITHER SOUTH OR WEST OF THIS POINT
C  GUESS THAT WE CAN START MAKING THE GRID
C  START THE GRID DRAWING THE LATS EAST AND WEST
      LONG = WLONG
      LAT = SLAT
      DLONG = (ELONG - WLONG) / 10.001
      CALL UTM (LAT, WLONG, X, Y)
      CALL NUMBER (X-.75, Y, .14, MINLAT, 0., -1)
      CALL NUMBER (X-.30, Y, .14, MINLATM, 0., -1)
      CALL PLOT (X, Y, PENUP)
      PEN = PENDOWN
      GO TO 25
C  DRAWING A LAT FROM WEST TO EAST
   20 PEN = PENUP
      LAT = LAT + MIN
```

```
      DLONG = -DLONG
      LONG = WLONG
      IF (LAT .GT. NLAT) GO TO 40
   25 IF (LONG .GT. ELONG) GO TO 30
      CALL UTM (LAT, LONG, X, Y)
      CALL PLOT (X, Y, PEN)
      PEN = PENDOWN
      LONG = LONG + DLONG
      GO TO 25
C  DRAWING A LAT FROM THE EAST TO WEST
   30 PEN = PENUP
      LAT = LAT + MIN
      IF (LAT .GT. NLAT) GO TO 40
      LONG = ELONG
      DLONG = -DLONG
      CALL UTM (LAT, LONG, X, Y)
      CALL PLOT (X, Y, PEN)
      PEN = PENDOWN
   35 LONG = LONG + DLONG
      IF (LONG .LT. WLONG) GO TO 20
      CALL UTM (LAT, LONG, X, Y)
      CALL PLOT (X, Y, PEN)
      GO TO 35
   40 CONTINUE
C  DONE WITH EAST AND WEST PORTION OF THE GRID
C  NOW LETS DO THE NORTH AND SOUTH LINES
      LONG = WLONG
      LAT = SLAT
      DLAT = (NLAT - SLAT) / 10.001
      CALL UTM (LAT, LONG, X, Y)
      CALL NUMBER (X-.40, Y-.25, .14, MINLONG, 0., -1)
      CALL NUMBER (X+.10, Y-.25, .14, MINLONGM, 0., -1)
      CALL PLOT (X, Y, PENUP)
      PEN = PENDOWN
      GO TO 50
C  DRAWING A LONG FROM SOUTH TO NORTH
   45 PEN = PENUP
      LONG = LONG + MIN
      DLAT = -DLAT
      LAT = SLAT
      IF (LONG .GT. ELONG) GO TO 70
   50 IF (LAT .GT. NLAT) GO TO 55
      CALL UTM (LAT, LONG, X, Y)
      CALL PLOT (X, Y, PEN)
      PEN = PENDOWN
      LAT = LAT + DLAT
      GO TO 50
C  DRAWING A LONG FROM NORTH TO SOUTH
   55 PEN = PENUP
      LONG = LONG + MIN
      IF (LONG .GT. ELONG) GO TO 70
      LAT = NLAT
      DLAT = -DLAT
      CALL UTM (LAT, LONG, X, Y)
      CALL PLOT (X, Y, PEN)
      PEN = PENDOWN
   60 LAT = LAT + DLAT
      IF (LAT .LT. SLAT) GO TO 45
      CALL UTM (LAT, LONG, X, Y)
      CALL PLOT (X, Y, PEN)
      GO TO 60
C  DONE WITH THE GRID
   70 CONTINUE
      RETURN
      END
```

```
UTM
      COMPILER DOUBLE PRECISION
      SUBROUTINE UTM (LAT, LONG, X, Y)
C  THIS SUBROUTINE CONVERTS LAT (PHI), LONG (DLAMBDA) TO X, Y
C  IN UTM COORDINATES IN INCHES FROM THE LOWER LEFT CORNER OF
C  THE PLOT AT SCALE.
      REAL  LA, LB, LESQ, LM, NU, LALA, MTOI, LAT, LONG, K0
C  UTM1 HAS PROJECTION PARAMETERS THAT ARE PASSED FROM UTMGRID
      COMMON /UTM1/  SCALE, X0, Y0, DTOR, MTOI, A, B, C, LA, LALA,
     1                  LESQ, OMLESQ, CMERID, K0
      PHI = LAT * DTOR
      SINPHI = SIN (PHI)
      SPSP = SINPHI * SINPHI
      RHO = LA * OMLESQ / (1.0 - LESQ * SPSP) ** 1.5
      NU = LA / SQRT (1.0 - LESQ * SPSP)
      LM = LA * OMLESQ * (A * PHI - B * SIN (2. * PHI) / 2. +
     1     C * SIN (4. * PHI) / 4.)
      DLAMBDA = (LONG - CMERID) * DTOR
      DLDL = DLAMBDA * DLAMBDA
      DLDLDL = DLDL * DLAMBDA
      SINPHI = SIN (PHI)
      COSPHI = COS (PHI)
      TANPHI = TAN (PHI)
      Y = K0 * (LM + DLDL * NU / 2.0 * SINPHI * COSPHI)
      X = K0 * (DLAMBDA * NU * COSPHI + DLDLDL * NU / 6.0 * COSPHI ** 3 *
     1    (NU / RHO - TANPHI * TANPHI))
C  SCALE X AND Y TO INCHES ON THE PAPER
      X = X * SCALE * MTOI - X0
      Y = Y * SCALE * MTOI - Y0
      RETURN
      END
```

MGNAV

1	750820	0400	71	15.63	-157	01.00
2	750820	0500	71	10.17	-157	24.20
3	750820	0512	71	08.78	-157	30.60
4	750820	0540	71	04.58	-157	47.50
5	750820	0600	71	02.54	-157	55.60
6	750820	2000	71	10.73	-157	07.50
7	750820	2015	71	12.80	-157	02.80
8	750820	2025	71	14.02	-156	59.60
9	750820	2035	71	15.07	-156	56.80
10	750820	2040	71	15.70	-156	55.30
1	760805	2240	70	50.70	-159	50.30
2	760805	2300	70	48.50	-159	56.45
3	760805	2315	70	47.20	-160	01.20
4	760805	2330	70	45.80	-160	05.10
5	760805	2340	70	45.23	-160	06.70
6	760806	0001	70	45.54	-160	05.30
7	760806	0104	70	45.96	-160	01.39
8	760806	0115	70	44.80	-160	06.10
9	760806	0130	70	44.50	-160	08.30
10	760806	0145	70	43.95	-160	08.30
11	760806	0200	70	43.70	-160	08.30
1	760806	0215	70	44.80	-160	10.90
2	760806	0230	70	46.70	-160	15.70
3	760806	0245	70	47.90	-160	19.00
4	760806	0300	70	50.00	-160	24.00
5	760806	0316	70	52.20	-160	30.00
6	760806	0540	70	45.00	-160	30.00
7	760806	0600	70	44.00	-160	25.00
8	760806	0630	70	42.50	-160	17.20
1	760807	2100	70	44.60	-160	12.40
2	760807	2156	70	46.50	-160	02.20
3	760807	2210	70	48.60	-159	56.70
4	760807	2225	70	50.70	-159	50.70
5	760807	2235	70	52.25	-159	46.70
6	760807	2250	70	54.60	-159	42.90
7	760807	2300	70	55.20	-159	39.30
8	760807	2310	70	56.58	-159	35.30
9	760807	2320	70	57.60	-159	30.70
10	760807	2330	70	58.40	-159	25.40
30	760811	1845	71	06.45	-154	30.80
31	760811	1900	71	05.63	-154	24.30
32	760811	1915	71	04.44	-154	19.10
33	760811	1930	71	03.15	-154	13.40
34	760811	1945	71	02.45	-154	08.53
35	760811	2000	71	01.40	-154	03.60
36	760811	2015	71	00.45	-153	58.60
37	760811	2030	71	00.00	-153	51.80
38	760811	2045	71	00.55	-153	42.45
39	760811	2100	70	59.50	-153	39.40
40	760811	2115	71	00.30	-153	35.20
41	760811	2315	71	01.00	-153	27.80
42	760811	2330	71	01.10	-153	22.30
43	760811	2345	71	01.10	-153	18.30
44	760812	0000	71	01.56	-153	13.00
45	760812	0015	71	01.70	-153	02.40
46	760812	0030	71	00.60	-152	58.90
47	760812	0045	71	00.00	-152	55.20
48	760812	0100	70	59.50	-152	47.30
49	760812	0115	70	59.20	-152	40.60
50	760812	0130	70	58.30	-152	35.40
51	760812	0145	70	58.70	-152	39.80
52	760812	0200	70	59.30	-152	45.40
53	760812	0215	70	59.80	-152	50.40
54	760812	0230	71	00.50	-152	54.50
55	760812	0245	71	01.30	-153	00.90
56	760812	0300	71	01.50	-153	02.20
57	760812	0315	71	02.10	-153	06.90
58	760812	0330	71	02.10	-153	12.70
59	760812	0345	71	02.70	-153	18.00
60	760812	0400	71	02.90	-153	24.00
61	760812	0740	71	00.90	-153	02.40
62	760812	0800	71	00.40	-152	53.50
63	760812	0820	70	59.35	-152	44.60
64	760812	0900	70	58.65	-152	39.55
65	760812	0922	70	58.00	-152	32.30
66	760812	0940	70	56.95	-152	25.00
67	760812	1000	70	55.65	-152	17.20
68	760812	1020	70	55.00	-152	09.30
69	760812	1040	70	54.20	-152	00.70
70	760812	1100	70	53.45	-151	53.00
71	760812	1120	70	53.20	-151	43.50
72	760812	1140	70	51.10	-151	35.00
73	760812	1200	70	50.20	-151	29.00
74	760812	1220	70	48.50	-151	19.00
75	760812	1240	70	47.50	-151	10.00
76	760812	1300	70	47.90	-151	05.00
77	760812	1320	70	46.50	-150	55.00
78	760812	1340	70	44.70	-150	48.00
79	760812	1400	70	44.00	-150	40.00
80	760812	1420	70	41.42	-150	32.90
81	760812	1440	70	41.32	-150	21.30
82	760812	1500	70	40.88	-150	10.40
83	760812	1520	70	40.10	-150	02.80
84	760812	1540	70	38.90	-149	52.90
85	760812	1600	70	37.60	-149	43.00
86	760815	0540	70	32.12	-148	39.50
87	760815	0600	70	32.95	-148	46.80
88	760815	0620	70	34.66	-148	56.20
89	760815	0640	70	35.78	-149	05.40
90	760815	0702	70	[illegible] 95	-149	15.30
91	760815	0722	70	[illegible] 20	-149	25.00
92	760815	0802	70	35.80	-149	30.00
93	760815	0820	70	36.80	-149	37.50
94	760815	0840	70	37.10	-149	30.75
95	760815	0900	70	37.47	-149	56.00
96	760815	0920	70	37.25	-150	07.20
97	760815	0950	70	36.80	-150	23.50
98	760815	1000	70	36.75	-150	30.00
99	760815	1025	70	37.45	-150	39.00
100	760815	1140	70	37.53	-150	38.60
101	760815	1200	70	37.45	-150	27.00
102	760815	1220	70	37.09	-150	16.91
103	760815	1242	70	37.18	-150	03.65
104	760815	1300	70	37.41	-149	50.10
105	760815	1320	70	37.50	-149	57.20
106	760815	1340	70	37.50	-149	57.20
107	760815	1400	70	37.50	-149	57.20
108	760815	1420	70	37.30	-149	54.00
109	760815	1435	70	36.67	-149	46.85
110	760815	1500	70	36.25	-149	36.25
111	760815	1520	70	36.50	-149	30.75
112	760815	1540	70	35.50	-149	20.00
113	760815	1600	70	35.50	-149	09.80
114	760817	0500	71	00.10	-152	00.20
115	760817	0520	70	59.10	-151	54.40
116	760817	0540	70	57.90	-151	47.10
117	760817	0600	70	56.60	-151	38.20
118	760817	0620	70	56.10	-151	27.70
119	760817	0640	70	55.30	-151	17.70
120	760817	0700	70	53.90	-151	08.30
121	760817	0720	70	53.90	-151	08.30
122	760817	0740	70	52.90	-151	00.40
123	760817	0800	70	51.80	-150	50.70
124	760817	0820	70	47.20	-150	50.06
125	760817	0850	70	45.00	-150	42.00
126	760817	0900	70	44.00	-150	39.00
127	760817	0925	70	42.50	-150	24.50
128	760817	0938	70	39.59	-150	12.70
129	760818	0300	70	40.35	-150	00.20
130	760818	0320	70	41.60	-150	10.70
131	760818	0340	70	42.60	-150	20.20
132	760818	0400	70	44.20	-150	29.00
133	760818	0420	70	45.80	-150	39.20
134	760818	0440	70	47.50	-150	48.00
135	760818	0500	70	47.40	-150	50.00
136	760818	0520	70	49.00	-150	52.00
137	760818	0540	70	49.20	-151	05.80
138	760818	0600	70	50.60	-151	15.00
139	760818	0620	70	52.60	-151	24.50
140	760818	0640	70	54.00	-151	33.00
141	760818	0700	70	54.00	-151	44.00
142	760818	0720	70	55.60	-151	55.00
143	760818	0740	70	56.78	-152	08.00
144	760818	1000	71	02.80	-152	59.40
145	760818	1020	71	04.12	-153	05.10
146	760818	1040	71	05.60	-153	13.20
147	760818	1100	71	06.25	-153	26.10
148	760818	1120	71	07.00	-153	35.20
149	760818	1140	71	07.45	-153	36.50
150	760818	1200	71	07.60	-153	42.20
151	760818	1220	71	08.40	-153	52.80
152	760818	1245	71	09.17	-154	05.00
153	760818	1300	71	10.00	-154	14.40
154	760818	1320	71	11.40	-154	26.55
155	760818	1342	71	12.20	-154	38.40

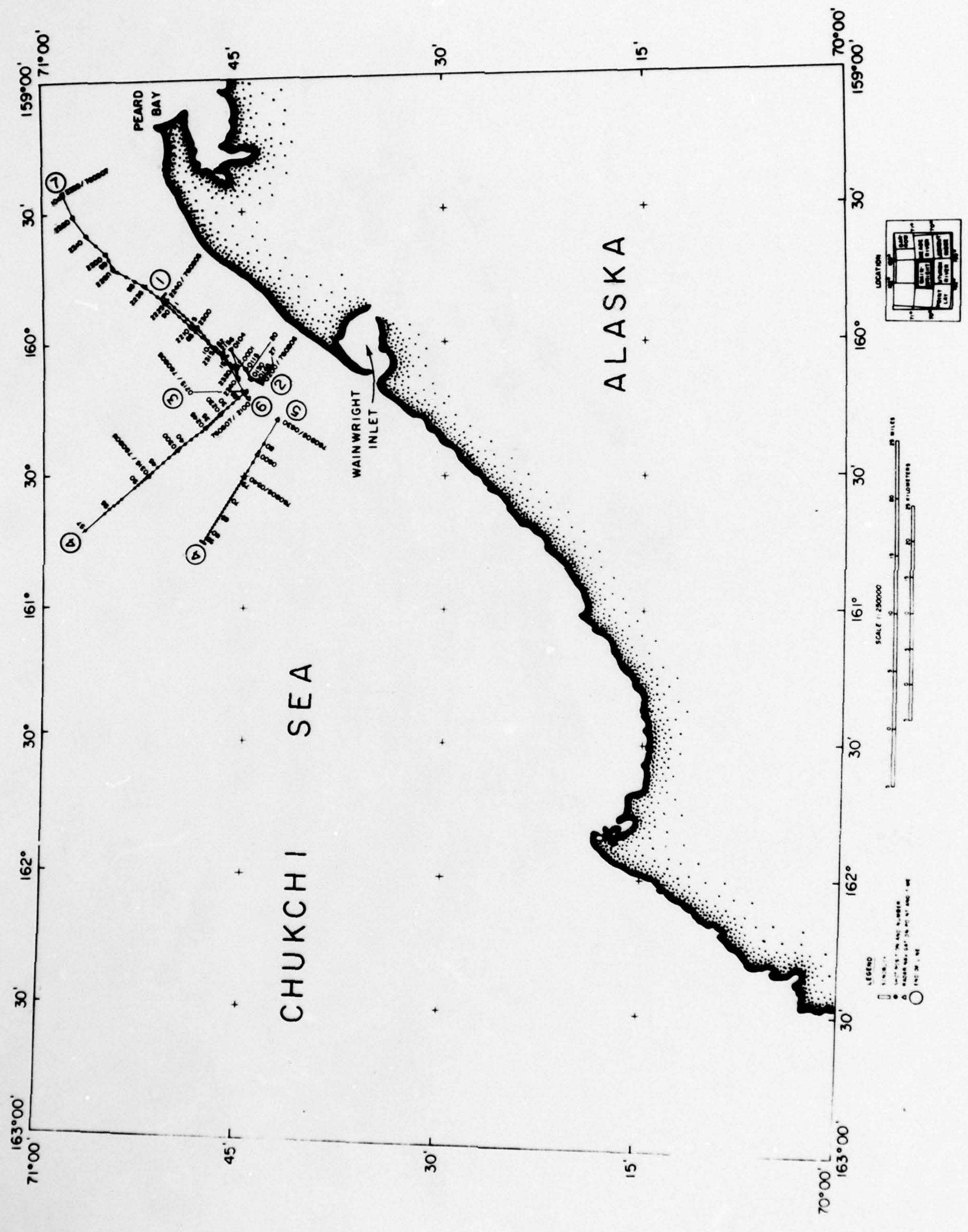


Figure 3. Tracklines and shot locations of Lines 1-2, 3-4, 4-5 and 6-7.

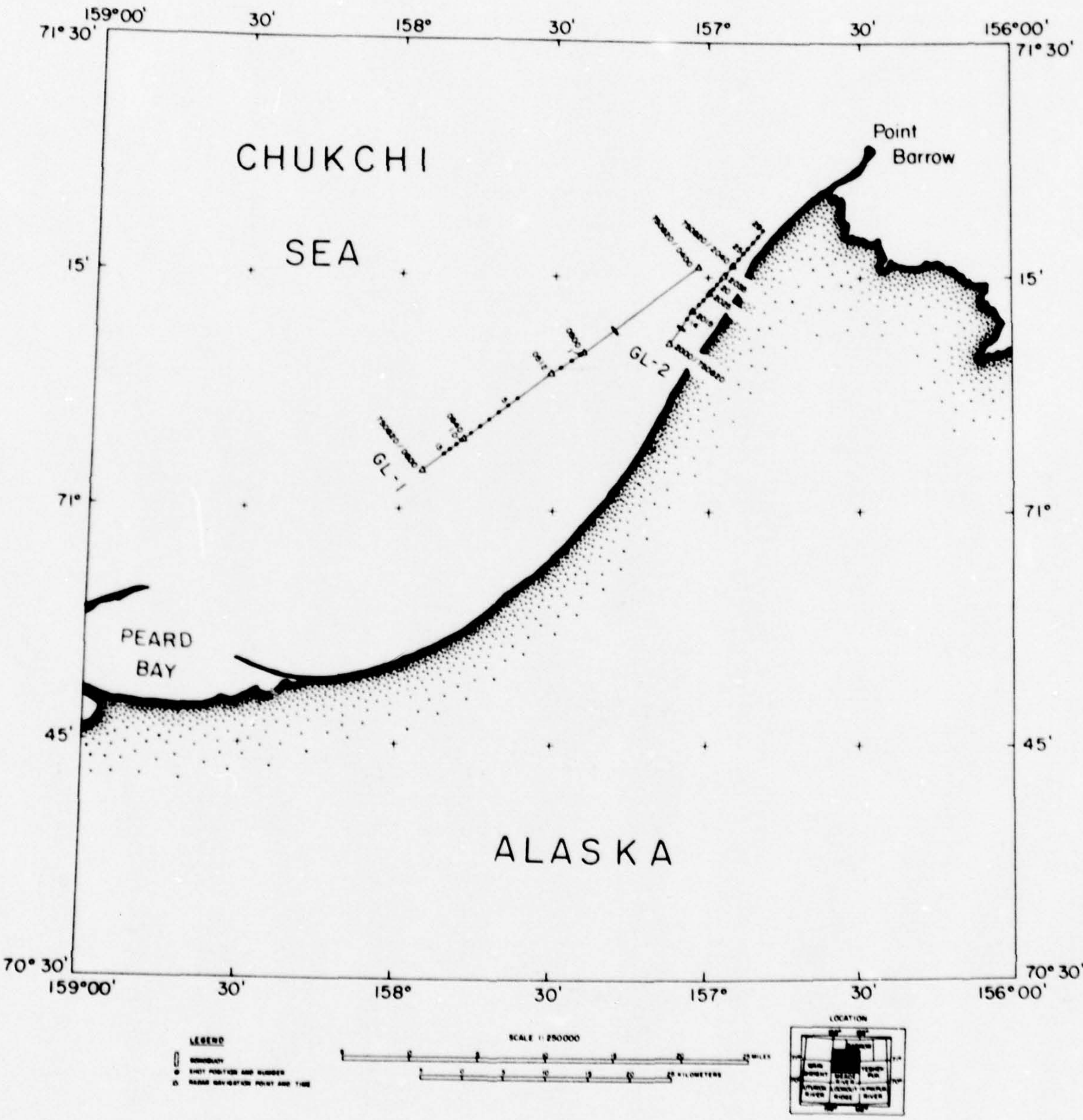


Figure 4. Tracklines and shot locations of Lines GL-1 and GL-2.

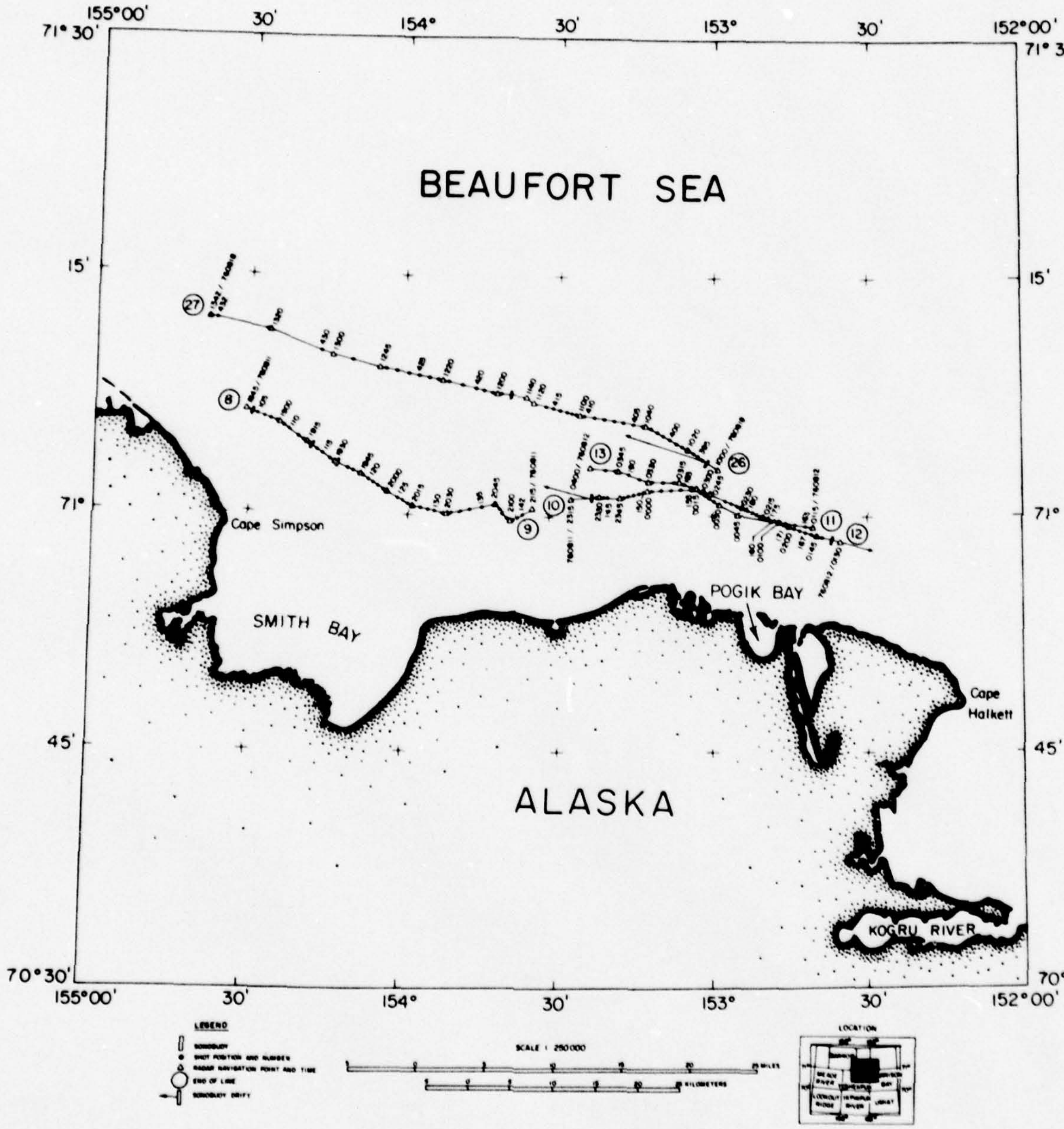


Figure 5. Tracklines and shot locations of Lines 8-9, 10-11, 12-13 and 26-27.

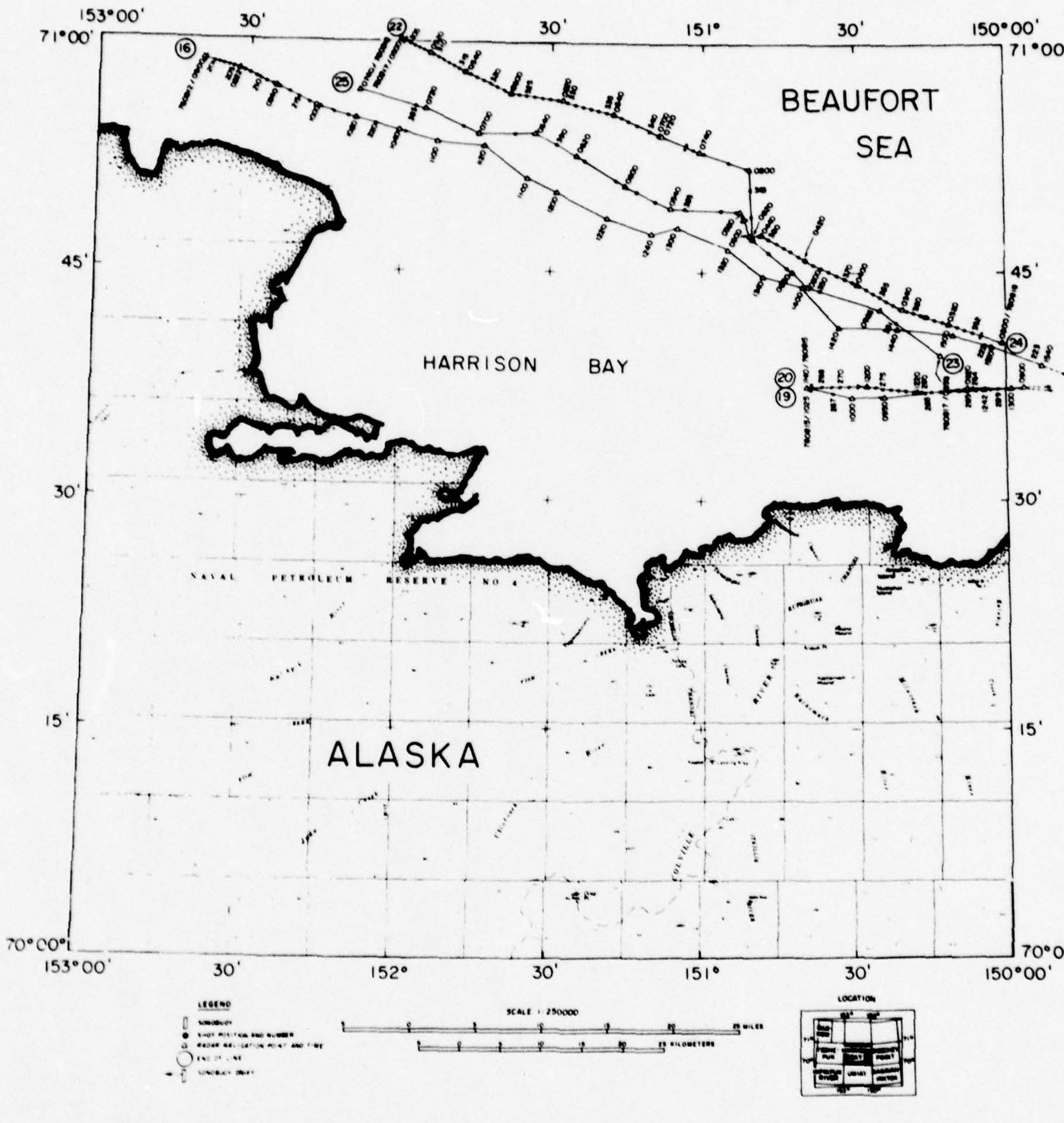


Figure 6. Tracklines and shot locations of Lines 16-17, 18-19 20-21, 22-23 and 24-25.

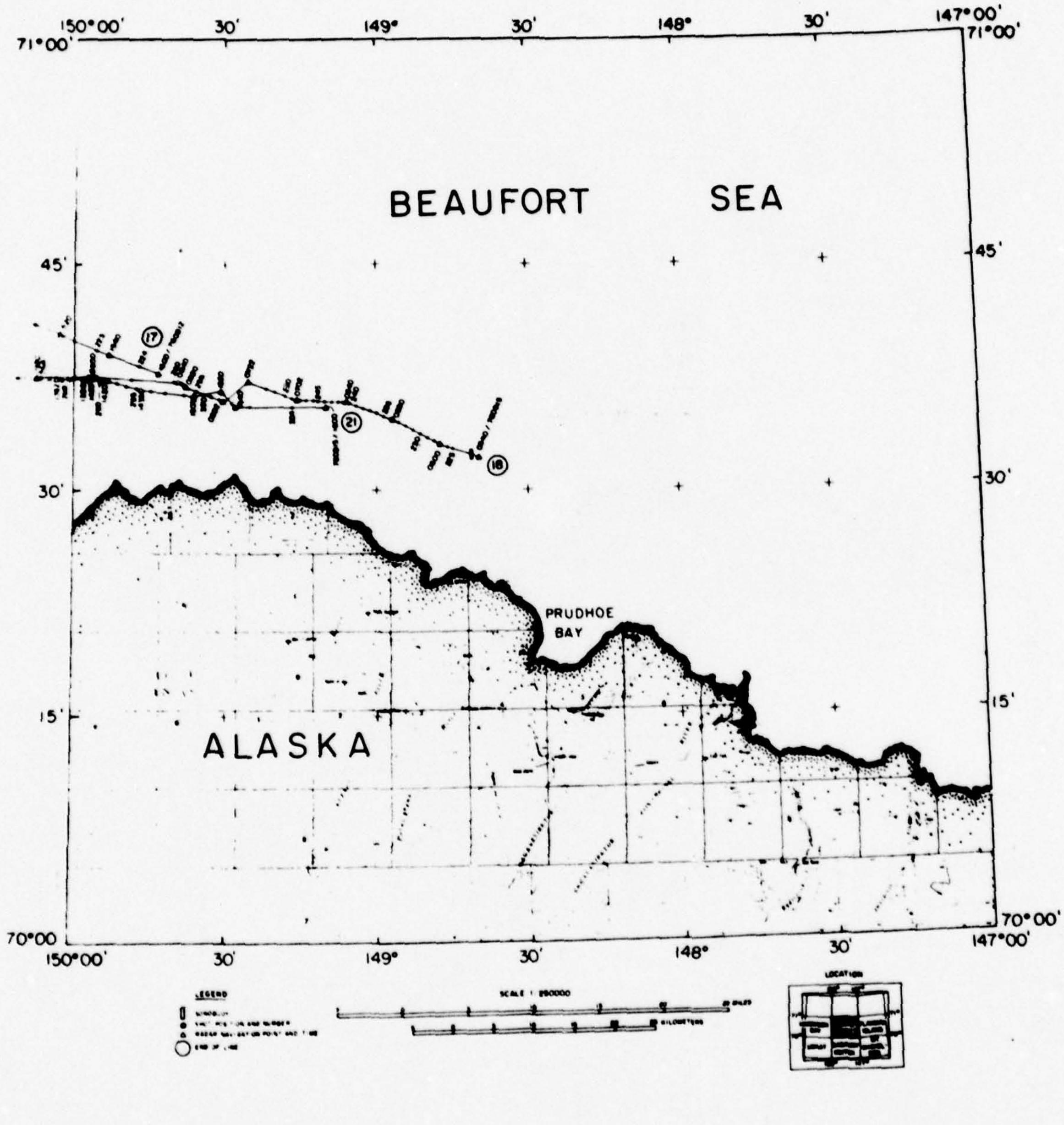


Figure 7. Tracklines and shot locations of Lines 16-17, 18-19 and 20-21.

II

COMPUTER PROGRAM TO FORM ARRIVAL TIME CORRECTIONS (TIMCORM) AND INPUT AND OUTPUT FILES FOR ALL LINES

```
      PROGRAM TIMCORM
      DIMENSION G(22),GC(22),A(11),R(4)
      READ(5,5)AID1,AID2
    5 FORMAT(2A8)
    6 READ(5,10)DBPM,DBBM,DBEM,TDTS,DRM,V1,SVMS,CLM,SLM,SDM
   10 FORMAT(3F5.0,7F5.2)
      WRITE(7,14)AID1,AID2
   14 FORMAT(2A8)
      WRITE(7,16)TDTS,V1
   16 FORMAT(15X,F5.2,5X,F5.3)
   15 FORMAT(* *,2A8,/)
      WRITE(61,15)AID1,AID2
      WRITE(61,17)
   17 FORMAT(*    DBRM  DBBM  DBEM  TCTS  DRM    V1     SVMS *,
     1*CLM   SLM   SDM*)
      WRITE(61,20)DBRM,DBBM,DBEM,TDTS,DRM,V1,SVMS,CLM,SLM,
     1SDM
   20 FORMAT(* *,3F6.0,2F6.2,F6.3,4F6.2)
      WRITE(61,25)
   25 FORMAT(*  SHOT TIME DISTS    TS    TC   TCOR  G1    G2*,
     1*    G3    G4    G5    G6*)
      N=0
      ILL=0
   30 READ(5,35)ACE,(A(I),I=1,11)
   35 FORMAT(A5,11F5.0)
      IF(EOF(5)) ILL=1
      IF(N.EQ.11.AND.ILL.EQ.1) GO TO 40
      IF(ILL.EQ.1) CALL EXIT
      IF(ACE.EQ.5H99999) GO TO 6
      IF(ACE.EQ.5H     ) GO TO 135
      ITYPE=0
   40 IF(ITYPE.EQ.0.AND.N.EQ.0) GO TO 95
      D=D+TC
      DISTS=D+TS
      DO 43 I=1,NR
   43 R(I)=R(I)+TC
      WRITE(7,45)SHOT,ITIM,DBSM,TS,D,(R(I),I=1,NR)
   45 FORMAT(A5,I5,F5.0,15X,6F5.2)
      DO 46 I=1,N
      G(I)=G(I)+TCOR+TC
   46 GC(I)=G(I)+TS
      IF(N.GT.11)GO TO 55
      WRITE(7,50)(G(I),I=1,N)
   50 FORMAT(5X,11F5.2)
      GO TO 60
   55 WRITE(7,50)(G(I),I=1,11)
      WRITE(7,50)(G(I),I=12,N)
   60 KN=N
      IF(N.GT.6)KN=6
      WRITE(61,65)SHOT,ITIM, DISTS,TS,TC,TCOR,(GC(I),I=1,KN)
      IF (KN.EQ.N) GO TO 90
   65 FORMAT(* *,A5,I5,10F6.2)
      KM=7
   70 IF(N.GT.KN+6) GO TO 75
      KN=N
      GO TO 80
   75 KN=KM+5
   80 WRITE(61,85)(GC(I),I=KM,KN)
   85 FORMAT(* *,34X,6F6.2)
      IF(KN.EQ.N)GO TO 90
      KM=KM+5
      GO TO 70
```

```
 90 IF(ILL.EQ.1) CALL EXIT
    IF(N.EQ.11) GO TO 94
    N=0
    GO TO 30
 94 N=0
 95 SHOT=ACE $ ITIM=A(1) $ DBSM=A(2) $ V2=A(3) $ VJ=A(4)
    BT=A(5) $ TS=A(6) $D=A(7)
    NR=0
    DO 100 I=1,4
    R(I)=A(I+7)
    IF(R(I).EQ.0.) GO TO 105
100 NR=I
105 S1=SQRT(1.-V1*V1/VJ/VJ)/V1
    S2=SQRT(1.-V1*V1/V2/V2)/V1
    SX=BT*SVMS
    SY=-40.55+1.513*BT
    IF(SY.GT.DBSM)SY=DBSM
    IF(SX.GT.CLM)GO TO 110
    TC=SQRT((SX-CLM)**2+(SY-SDM)**2)*.001/V1
    GO TO 120
110 TLM=CLM+SLM
    IF(SX.GT.TLM) GO TO 115
    WY=SDM-SY
    TC=ABS(WY)*.001/V1
    GO TO 120
115 TC=SQRT((SX-TLM)**2+(SY-SDM)**2)*.001/V1
120 CONTINUE
    ANG=ASINF(V1/VJ)
    OFFSET=DBSM*TANF(ANG)*.001/V1
    DMS=DBBM+(DBEM-DBBM)*(D+TS+TC-OFFSET)/TOTS
    OFFSET=DBRM*TANF(ANG)*.001/V1
    DMR=DBBM+(DBEM-DBBM)*OFFSET/TOTS
    C=(DMR-DBRM+DMS-DBSM)*.001
    IF(V2.NE.VJ) GO TO 125
    DT1=(SY+DRM)*S2*.001
    DT2=C*S2
    GO TO 130
125 S3=SQRT(1.-V2*V2/VJ/VJ)/V2
    DT1=(SY+DRM)*.001*S1
    DT2=C*(S1-S3)
130 CONTINUE
    TCOR=DT1+DT2
    ITYPE=1
    GO TO 30
135 NS=1
    IF(N.EQ.11) NS=12
    I=1
140 G(NS)=A(I)
    IF(G(NS).EQ.0) GO TO40
    N=NS
    IF(N.EQ.11)GO TO 30
    IF(N.EQ.22)GO TO 40
    NS=NS+1
    I=I+1
    GO TO 140
    END
```

INPUT FORMAT FOR PROGRAM TIMCORM

AID1	AID2										
DBRM	DBBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM		
SHOT	ITIM	DBSM	V2	VJ	BT	TS	D	R1	R2	R3	R4
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	
SHOT	ITIM	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	

AID1,AID2 : Line identification

DBRM : Depth to bottom at the receiver in meters; offset depth based on some average basement velocity.

DBBM : Depth to bottom at the beginning of the line in meters; DBBM and DBEM establish the reference slope.

DBEM : Depth to bottom at the end of the line in meters.

TDTS : Water wave travel time at most distant shot (total direct time in seconds with corrections).

DRM : Depth of the receiver in meters (hydrophone depth).

V1 : Velocity of the water layer in km/s.

SVMS : Ship's velocity in meters per seconds.

CLM : Cable length in meters.

SLM : Streamer length (active section only) in meters.

SDM : Streamer depth in meters.

SHOT : Shot number.

ITIM : Time of shot.

DBSM : Depth to the bottom at the shot point in meters. This should be the offset depth.

V2 : Velocity of the uppermost earth layer (usually sediment) in km/s.

VJ : Apparent velocity of waves for this shot; taken from apparent velocity of line on which this point lies.

BT : Burn time in seconds.

TS : Seismogram time correction. Time in seconds between shot break and zeroth second tic.

D : Direct water wave travel time from zeroth second.

R1,R2,R3,R4 : Travel time in seconds from zeroth second of waves reflected one,two,three or four times from the bottom.

G1,G2,...,G10 : Seismic travel times from zeroth second.

OUTPUT FORMAT FOR PROGRAM TIMCORM

AID1	AID2										
DBRM	DBBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM		
SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
SHOT	TIME	. . .									

AID1,AID2,DBRM,DBBM,DBEM,TDTS,DRM,V1,SVMS,CLM,SLM,SDM,SHOT,TIME : All the same as in input file.

TS : Seismogram time correction : time in seconds between shot break and zeroth second tic.

TC : Shot instant correction due to separation of shot and streamer.

TCOR : Surface and bottom corrections at shot and receiver.

DISTS : Corrected direct water wave travel time (includes TS and TC).

G1,G2,...,G6 : Corrected ground wave travel times (include TS,TC and TCOR).

```
LINE 1 CHUKCHI
42.7 42.7 42.7 15.0018.3  1.44 4.2654.3  4.6  2.
    1 050142.7  3.25 3.2534.8   .73 1.00
       .20  .35
    2 050542.7  3.25 3.2535.    .42 2.45
      1.02 1.11 1.59 1.95
    3 050942.7  3.25 5.0935.    .07 3.83
      1.65 1.80 1.85 2.15 2.62 3.42
    4 052342.7  3.25 5.0934.2   .51 7.25
      2.15 2.62 3.10 3.55 3.92 4.25 4.80 5.00
    5 052642.7  3.25 5.0933.8   .11 8.41
      2.95 4.05 4.27 4.95 5.72 5.87
    6 052942.7  3.25 5.0935.    .82 8.53
      2.44 3.20 3.65 4.09 4.22 4.60 5.18 5.50 5.60 5.80 6.40 7.02
    7 053242.7  3.25 5.0934.0   .18 9.95
      5.25 5.77 6.29 6.63 7.07 7.62 8.30
    8 053542.7  3.25 5.0930.8   .0310.93
      5.62 5.80 6.23 6.58 6.82 7.37 7.85 9.80
    9 053842.7  3.25 5.0934.0   .8010.96
      5.40 5.75 6.08 6.40 7.12 7.32 7.70 8.3010.12
   10 054142.7  3.25 5.0933.0   .2712.31
      6.55 6.80 7.15 8.17 8.65 9.3810.0011.32
   11 054442.7  3.25 5.0935.5   .1313.2513.48
      6.37 7.10 7.35 8.05 8.95 9.4510.2010.8312.36
   12 054742.7  3.25 5.0934.4   .2213.9514.86
      9.48 9.9810.7011.2011.8512.95
   13 055042.7  3.25 5.0932.2   .2714.7014.84
      8.12 8.90 9.25 9.65 9.8010.1510.5510.8612.4213.30
```

LINE 1 CHUKCHI CORRECTED

DBRM	DBBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
43	43	43	15.00	18.30	1.440	4.26	54.30	4.60	2.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
1	501	1.79	.73	.06	.02	1.01	1.16				
2	505	2.93	.42	.06	.02	1.52	1.61	2.09	2.45		
3	509	3.96	.07	.06	.02	1.80	1.95	2.00	2.30	2.77	3.57
4	523	7.82	.51	.06	.02	2.74	3.21	3.69	4.14	4.51	4.84
						5.39	5.59				
5	526	8.58	.11	.06	.02	3.14	4.24	4.46	5.14	5.91	6.06
6	529	9.41	.82	.06	.02	3.34	4.10	4.55	4.99	5.12	5.50
						6.08	6.40	6.50	6.76	7.30	
7	532	10.19	.18	.06	.02	5.51	6.03	6.55	6.89	7.33	7.88
						8.56					
8	535	11.01	.03	.05	.02	5.71	5.89	6.32	6.67	6.91	7.46
						7.94	9.89				
9	538	11.82	.80	.06	.02	6.28	6.63	6.96	7.28	8.00	8.20
						8.58	9.18	11.00			
10	541	12.64	.27	.06	.02	6.90	7.15	7.50	8.52	9.00	9.73
						10.35	11.67				
11	544	13.44	.13	.06	.02	6.58	7.31	7.56	8.26	9.16	9.66
						10.41	11.04	12.57			
12	547	14.23	.22	.06	.02	9.78	10.28	11.00	11.50	12.15	13.25
13	550	15.02	.27	.05	.02	8.46	9.24	9.59	9.99	10.14	10.49
						10.89	11.20	12.76	13.64		

```
LINE 2 CHUKCHI
30.  30.  23.     8.6918.3  1.44 6.6654.3  4.7  2.
   14 201130.     3.68 3.6835.      .27  .51
      .36
   15 201530.     3.68 3.6838.7   -.12 1.58
      .97
   16 201829.5    3.68 3.6838.0    .45 1.54
      .63
   17 202129.     3.60 3.6835.9    .51 2.81
      .80
   18 202428.5    3.68 3.6836.7    .41 2.64 2.90
      1.09 1.18
   19 202728.     3.68 5.0535.9    .38 3.20 3.65
      1.23 1.31 1.45 1.60
   20 203027.5    3.68 5.0537.0    .54 3.57 3.90
      1.20 1.30 1.46 1.58 1.78 2.01
   21 203326.5    3.68 5.0555.3    .01 4.60 4.90
      1.76 1.96 2.29 2.60
   22 203625.5    3.68 5.0556.9    .79 4.35 5.09
      1.15 1.38 1.43 1.78 2.00
   23 204024.5    3.68 5.0556.6    .76 5.09 5.33
      1.38 1.54 1.66 2.14 2.30
   24 204323.5    3.68 5.0555.6    .15 6.20 6.45
      2.12 2.64 2.90 3.18 3.25
   25 204623.     3.68 5.0552.9   -.02 6.55 7.27
      2.47 2.97 3.40 3.65 3.80
   26 204923.     3.68 5.0553.1    .64 6.70 7.07
      1.92 1.94 2.28 2.42 3.27 3.44
   27 205223.     3.68 5.0554.6    .90 6.90 7.24
      1.79 1.95 2.35 2.73 3.03 3.32
   28 205523.     3.68 5.0563.6    .38 7.79 8.14
      2.40 2.55 2.77 3.17 3.80 4.10
   29 205823.     3.68 5.0573.1    .28 8.29 8.64
      2.60 2.80 3.15 3.48 3.98 4.40
```

LINE 2 CHUKCHI CORRECTED

DBRM	DBBM	DBEM	TDTS	DRM	V1	SVNS	CLM	SLM	SDM
30	30	23	8.69	18.30	1.440	6.66	54.30	4.70	2.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
14	2011	.90	.27	.12	.02	.77					
15	2015	1.60	-0.12	.14	.02	1.01					
16	2018	2.13	.45	.14	.02	1.24					
17	2021	2.65	.51	.13	.02	1.46					
18	2024	3.18	.41	.13	.02	1.65	1.74				
19	2027	3.71	.38	.13	.02	1.76	1.84	1.98	2.13		
20	2030	4.24	.54	.13	.02	1.89	1.99	2.15	2.27	2.47	2.70
21	2033	4.83	.01	.22	.03	2.02	2.22	2.55	2.86		
22	2036	5.36	.79	.22	.03	2.19	2.34	2.47	2.82	3.04	
23	2040	6.07	.76	.22	.03	2.39	2.55	2.67	3.15	3.31	
24	2043	6.57	.15	.22	.03	2.52	3.04	3.30	3.58	3.65	
25	2046	7.13	-0.02	.20	.03	2.68	3.18	3.61	3.86	4.01	
26	2049	7.55	.64	.21	.03	2.79	2.81	3.15	3.29	4.14	4.31
27	2052	8.01	.90	.21	.03	2.93	3.09	3.49	3.87	4.17	4.46
28	2055	8.42	.38	.25	.03	3.06	3.21	3.43	3.83	4.46	4.76
29	2058	8.87	.28	.30	.03	3.20	3.40	3.75	4.00	4.58	5.00

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BURTON ISL  1-2
  37.  40.  40.18.3018.3  1.44 4.7961.    4.57 1.
   1 2245  37. 3.13 3.1340.     .70  .56
      .01
   2 2248  37. 3.13 3.1337.5    .43 1.50
      .61
   3 2251  37. 3.13 3.1348.6    .86 1.68
      .42
   4 2254  37. 3.13 3.7447.6    .97 2.19
      .58  .98
   5 2257  37. 3.13 3.7445.6    .89 2.85
      .87
   6 2300  37. 3.13 3.7448.0    .65 3.73
     1.37 1.83 2.15
   7 2303  37. 3.13 3.7446.1    .51 4.44
     1.72 2.12
   8 2306  37. 3.13 3.7448.0    .57 4.94
     1.88 2.42 2.73
   9 2310  33. 3.13 3.7445.2    .48 5.79
     2.24 2.91 3.13
  11 2316  33. 3.13 5.4346.6    .23 7.20
     2.95 3.50 3.95 4.60
  12 2319  33. 3.13 5.4345.8    .88 7.15
     2.48 3.12 3.47 3.96
  13 2322  33. 3.13 5.4346.0    .92 7.71
     2.60 3.27 3.74 4.17 4.59 5.08
  14 2325  33. 3.13 5.4347.     .87 6.40
     2.80 3.60 4.04 4.45 5.10
  15 2328  33. 3.13 5.4348.9    .23 9.65
     3.61 3.97 4.51 4.95 5.41 5.80 6.18
  16 2331  33. 3.13 5.4345.5    .4710.09
     3.56 3.98 4.60 5.94 6.27 6.45
99999
  37.  40.  40.18.3018.3  1.44 2.7361.    4.57 1.
  17 0110  28. 3.13 5.4367.1    .6813.31
     4.23 4.56 5.61 6.10 7.01 7.70 8.85
  20 0120  28. 3.13 5.4372.5    .2514.81
     4.99 5.19 5.81 6.29 8.26
  21 0124  28. 3.13 5.4373.     .5114.97
     4.82 5.64 8.80
  22 0128  28. 3.13 5.4373.8    .3015.63
     5.15 6.70 7.69 9.15
  23 0132  27. 3.13 5.4384.8    .0416.36
     5.54 6.59 7.10 8.59 8.99 9.6010.25
  24 0136  25. 3.13 5.4382.9    .7516.03
     4.89 5.92 6.58 7.00 7.31 8.38 8.98 9.73
  25 0140  26. 3.13 5.4381.5    .9316.31
     4.88 5.17 8.3810.06
  26 0144  28. 3.13 5.43111.5  .9916.79
     4.97 6.13 8.49 9.5810.1611.10
  27 0149  31. 3.13 5.43115.5  .5717.72
     5.53 6.7410.74
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BURTON ISL  1-2 CORRECTED
  DBRM  DBBM  DBEM  TOTS  DRM   V1    SVMS  CLM   SLM   SDM
   37    40    40 18.30 18.30 1.440  4.79 61.00  4.57  1.00
 SHOT TIME DISTS   TS    TC   TCOR  G1    G2    G3    G4    G5    G6
    1 2245  1.35   .70   .09   .03   .83
    2 2248  2.01   .43   .08   .02  1.14
    3 2251  2.66   .86   .12   .04  1.43
    4 2254  3.27   .97   .11   .03  1.70  2.10
    5 2257  3.85   .89   .11   .03  1.90
    6 2300  4.50   .65   .12   .04  2.17  2.63  2.95
    7 2303  5.06   .51   .11   .03  2.37  2.77
    8 2306  5.63   .57   .12   .04  2.60  3.14  3.45
    9 2310  6.38   .48   .11   .03  2.86  3.53  3.75
   11 2316  7.54   .23   .11   .04  3.33  3.88  4.33  4.98
   12 2319  8.14   .89   .11   .04  3.50  4.14  4.49  4.96
   13 2322  8.74   .92   .11   .04  3.67  4.34  4.81  5.24  5.66  6.15
   14 2325  9.38   .87   .11   .04  3.82  4.62  5.06  5.47  6.12
   15 2328 10.00   .23   .12   .04  4.00  4.36  4.90  5.34  5.80  6.19
                                    6.57
   16 2331 10.67   .47   .11   .04  4.17  4.59  5.21  6.55  6.88  7.06
BURTON ISL  1-2

  DBRM  DBBM  DBEM  TOTS  DRM   V1    SVMS  CLM   SLM   SDM
   37    40    40 18.30 18.30 1.440  2.73 61.00  4.57  1.00
 SHOT TIME DISTS   TS    TC   TCOR  G1    G2    G3    G4    G5    G6
   17  110 14.07   .68   .08   .04  5.03  5.36  6.41  6.90  7.81  8.50
                                    9.65
   20  120 15.15   .25   .09   .04  5.37  5.57  6.19  6.67  8.64
   21  124 15.57   .51   .03   .04  5.46  6.28  9.44
   22  128 16.03   .30   .10   .04  5.58  7.13  8.12  9.58
   23  132 16.52   .04   .12   .04  5.73  6.78  7.29  8.78  9.18  9.79
                                   10.44
   24  136 16.89   .75   .11   .04  5.79  6.82  7.40  7.90  8.81  9.28
                                    9.88 10.63
   25  140 17.35   .93   .11   .04  5.96  6.25  9.46 11.14
   26  144 17.95   .99   .17   .04  6.16  7.32  9.68 10.77 11.35 12.29
   27  149 18.46   .57   .17   .04  6.31  7.52 11.52
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BURTON ISL 3-4
  38.  45.  57.19.3018.3  1.44 4.9661.    4.57 1.
   28 0220  38. 2.93 2.9339.0   .73  .10
      -.27 -.23
   29 0223  40. 2.93 2.9342.5   .08 1.23
       .65  .97
   30 0226  42. 2.93 2.9344.0   .20 1.71
       .82 1.02
   31 0229  44. 2.93 2.9342.6   .48 2.05
       .85 1.12 1.45
   32 0232  46. 2.93 3.9041.9   .98 2.17
       .60  .80  .97
   33 0235  47. 2.93 3.9041.8   .04 3.73
      1.78 2.08 2.37
   34 0238  48. 2.93 3.9047.8   .65 3.72
      1.39 1.76 2.13
   35 0241  48. 2.93 3.9047.4   .06 4.52
      2.20 2.55 3.09
   36 0244  49. 2.93 3.9045.8   .43 5.18
      2.07 2.35 2.82 3.09
   37 0247  50. 2.93 3.9046.4   .22 6.07
      2.51 2.99 3.73
   38 0250  51. 2.93 3.9046.7   .63 6.30
      2.34 2.82 3.19
   39 0253  51. 2.93 3.9046.5   .51 7.05
      2.67 3.20 3.59 4.23
   40 0256  52. 2.93 3.9070.5   .93 7.15
      2.40 2.65 2.95 3.39 3.69 4.13
   41 0259  52. 2.93 3.9070.9   .10 8.64
      3.57 3.97 4.42 5.30 7.08
   42 0302  52. 2.93 4.7773.5   .38 8.97
      3.41 3.86 4.34 5.50 6.39 7.37
   43 0305  53. 2.93 4.7771.7   .91 9.10
      3.07 3.18 3.64 4.17 4.77 5.40
   44 0308  53. 2.93 4.7771.3   .0410.63
      4.15 4.75 5.20 5.63 5.87 6.70
   45 0311  53. 2.93 4.7770.0   .8410.46
      3.48 4.20 4.67 5.03 5.42 6.22 7.00 7.50
   46 0314  53. 2.93 4.7772.5   .3611.55
      4.17 4.43 4.96 5.31 5.85 7.13
   47 0317  53. 2.93 4.7781.0   .0012.41
      4.72 4.90 5.46 5.98 6.37 7.03 7.67
   48 0320  53. 2.93 4.7777.0   .4912.58
      4.48 4.72 5.21 5.67 6.12 6.72 7.33 7.60 8.31
   50 0327  54. 2.93 4.7797.8   .0714.46
      5.30 6.05 6.68 7.56 7.90 8.55
99939
  38.  45.  57.19.3018.3  1.44 1.9261.    4.57 1.
   53 0349  56. 2.93 4.77101.3  .6516.93
      5.70 6.00 6.26 6.85 7.73 8.16 8.70 9.2210.23
   54 0353  55. 2.93 4.77 97.4  .3517.52
      6.10 6.57 7.20 8.16 8.61 9.18 9.8310.98
   55 0358  55. 2.93 4.77 94.5  .1918.28
      6.43 6.81 6.52 8.05 8.52 9.00 9.5510.2311.40
   56 0403  53. 2.93 4.77 99.0  .3418.71
      6.65 7.70 8.20 8.65 9.7710.4711.77
   57 0423  52. 2.93 4.77117.6  .5919.70
      6.50 7.56 7.92 8.8510.2110.9311.6012.31
```

BURTON ISL 3-4 CORRECTED

DBRM	DBBM	DBEM	TDIS	DRM	V1	SVMS	CLM	SLM	SDM
38	45	57	19.30	18.30	1.440	4.96	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
28	220	.92	.73	.09	.03	.58	.62				
29	223	1.41	.08	.10	.03	.87	1.19				
30	226	2.02	.20	.11	.03	1.16	1.36				
31	229	2.63	.48	.10	.03	1.46	1.73	2.06			
32	232	3.25	.98	.10	.03	1.71	1.91	2.08			
33	235	3.87	.04	.10	.03	1.95	2.25	2.54			
34	238	4.49	.65	.12	.04	2.20	2.57	2.94			
35	241	5.10	.06	.12	.03	2.41	2.76	3.30			
36	244	5.72	.43	.11	.03	2.65	2.93	3.40	3.67		
37	247	6.41	.22	.12	.03	2.88	3.36	4.10			
38	250	7.05	.63	.12	.03	3.12	3.60	3.97			
39	253	7.68	.51	.12	.03	3.33	3.86	4.25	4.89		
40	256	8.28	.93	.20	.05	3.58	3.83	4.13	4.57	4.87	5.31
41	259	8.94	.10	.20	.05	3.92	4.32	4.77	5.65	7.43	
42	302	9.56	.38	.21	.05	4.05	4.50	4.98	6.14	7.03	8.01
43	305	10.21	.91	.20	.05	4.23	4.34	4.80	5.33	5.93	6.56
44	308	10.87	.04	.20	.05	4.44	5.04	5.49	5.92	6.16	6.99
45	311	11.50	.84	.20	.05	4.57	5.29	5.76	6.12	6.51	7.31
						8.09	8.59				
46	314	12.12	.36	.21	.05	4.79	5.05	5.58	5.93	6.47	7.75
47	317	12.65	0	.24	.05	5.01	5.19	5.75	6.27	6.66	7.32
						7.96					
48	320	13.29	.49	.22	.05	5.24	5.48	5.97	6.43	6.88	7.48
						8.09	8.36	9.07			
50	327	14.82	.07	.29	.05	5.71	6.46	7.09	7.97	8.31	8.96

BURTON ISL 3-4

DBRM	DBBM	DBEM	TDIS	DRM	V1	SVMS	CLM	SLM	SDM
38	45	57	19.30	18.30	1.440	1.92	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
53	349	17.68	.65	.10	.05	6.50	6.80	7.06	7.65	8.53	8.96
						9.50	10.02	11.03			
54	353	18.06	.35	.09	.05	6.59	7.06	7.69	8.65	9.10	9.67
						10.32	11.37				
55	358	18.56	.19	.09	.05	6.76	7.14	6.85	8.38	8.85	9.33
						9.88	10.56	11.73			
56	403	19.14	.34	.09	.05	7.14	8.19	8.69	9.14	10.26	10.96
						12.26					
57	423	20.41	.59	.12	.05	7.26	8.32	8.68	9.61	10.97	11.69
						12.36	13.07				

```
BURTCN ISL 4-5
  52.  57.  45.19.3018.3 1.44  4.9661.   4.57 1.
   58 0444  54. 2.77 2.7744.0   .65 -.14
      -.35
   59 0447  55. 2.77 2.7744.3   .81  .43
      -.16
   60 0450  56. 2.77 2.7742.7   .75 1.03
       .25
   61 0453  56. 2.77 2.7743.0   .37 2.07
       .92 1.15 1.61
   62 0456  55. 2.77 3.7847.0   .49 2.59
      1.06 1.17 1.50
   63 0459  54. 2.77 3.7842.5   .98 2.80
       .83 1.00 1.20 1.37
   64 0502  53. 2.77 3.7844.9   .74 3.69
      1.35 1.65
   65 0505  52. 2.77 3.7844.8   .49 4.59
      1.85 2.11 2.27
   66 0508  51. 2.77 3.7844.1   .60 5.14
      1.98 2.28 2.42 2.73
   67 0511  51. 2.77 3.7848.3   .47 5.89
      2.34 2.43 2.80 3.16
   68 0514  51. 2.77 3.7844.1   .52 6.44
      2.50 3.02 3.54 3.82
   69 0517  51. 2.77 3.7845.1   .72 6.85
      2.98 3.65
   71 0523  51. 2.77 3.7867.2   .37 8.41
      3.27 3.80 4.20 4.60 5.05 5.75
   72 0526  50. 2.77 3.7866.5   .98 8.43
      2.86 3.35 3.85 4.28 4.87
   73 0529  49. 2.77 3.7867.5   .33 9.69
      3.80 4.18 4.70 5.31 5.68 5.94
   74 0534  49. 2.77 4.7667.1   .93 9.71
      4.35 4.67 5.05 5.56
   75 0536  49. 2.77 4.7694.5   .4710.94
      4.06 4.65 5.28 5.95 6.41
   76 0540  49. 2.77 4.7695.6   .0912.12
      4.60 5.28 6.25 6.80 7.60
   77 0545  49. 2.77 4.7695.0   .3112.94
      5.86 6.50 7.14 7.80 8.16
99999
  52.  57.  45.19.3018.3  1.44 2.1661.   4.57 1.
   78 0553  48. 2.77 4.76118.7  .3814.10
      5.20 5.82 6.55 7.02 7.81 8.91
   79 0601  46. 2.77 4.76165.3  .6914.47
      4.98 6.02 6.87 7.67 9.05
   80 0609  44. 2.77 4.76166.6  .2715.63
      5.67 6.63 7.75 8.63 9.40 9.9010.63
```

BURTON ISL 4-5 CORRECTED

DBRM	DBBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
52	57	45	19.30	18.30	1.440	4.96	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
58	444	.62	.65	.11	.03	.44					
59	447	1.35	.81	.11	.03	.79					
60	450	1.88	.75	.10	.03	1.13					
61	453	2.54	.37	.10	.03	1.42	1.65	2.11			
62	456	3.20	.49	.12	.03	1.70	1.81	2.14			
63	459	3.88	.98	.10	.03	1.94	2.11	2.31	2.48		
64	502	4.54	.74	.11	.03	2.23	2.53				
65	505	5.19	.49	.11	.03	2.48	2.74	2.90			
66	508	5.85	.60	.11	.03	2.72	3.02	3.16	3.47		
67	511	6.48	.47	.12	.04	2.97	3.06	3.43	3.79		
68	514	7.07	.52	.11	.03	3.16	3.68	4.20	4.48		
69	517	7.68	.72	.11	.03	3.84	4.51				
71	523	8.97	.37	.19	.05	3.88	4.41	4.81	5.21	5.66	6.36
72	526	9.60	.98	.19	.05	4.07	4.56	5.06	5.49	6.08	
73	529	10.21	.33	.19	.05	4.37	4.75	5.27	5.88	6.25	6.51
74	534	10.83	.93	.19	.05	5.52	5.84	6.22	6.73		
75	536	11.69	.47	.28	.05	4.86	5.45	6.08	6.75	7.21	
76	540	12.50	.09	.29	.05	5.02	5.70	6.67	7.22	8.02	
77	545	13.53	.31	.28	.05	6.50	7.14	7.78	8.44	8.80	

BURTON ISL 4-5

DBRM	DBBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
52	57	45	19.30	18.30	1.440	2.16	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
78	553	14.62	.38	.14	.05	5.76	6.38	7.11	7.58	8.37	9.47
79	601	15.36	.69	.20	.04	5.92	6.96	7.81	8.61	9.99	
80	609	16.11	.27	.21	.04	6.19	7.15	8.27	9.15	9.92	10.42
						11.15					

```
BURTON ISL 6-7
  33.  37.   37.21.1518.3 1.44  5.2461.  4.57 1.
   81 2156  32. 2.70 2.7042.8  -.12 1.04
      .62
   82 2159  33. 2.70 2.7041.8   .56 1.00
      .32  .62
   83 2202  34. 2.70 3.7143.    .16 2.09
     1.05 1.26 1.64
   84 2205  34. 2.70 3.7143.5   .08 2.84
     1.41 1.61 1.70
   85 2208  35. 2.70 3.7144.3   .28 3.33
     1.46 1.89 2.47
   86 2211  36. 2.70 3.7142.5   .49 3.76
     1.51 1.87 2.60
   87 2214  36. 2.70 3.7142.5   .52 4.43
     1.75 2.16 3.20
   88 2217  37. 2.70 3.7144.1   .04 5.55
     2.42 3.00 3.90
   89 2220  37. 2.70 3.7145.2   .41 5.86
     2.34 2.93 3.28 3.60 4.10
   90 2223  38. 2.70 3.7143.9   .58 6.30
     2.45 3.01 3.45 3.87 4.30 4.60
   91 2226  40. 2.70 4.9745.8   .44 7.20
     2.86 3.06 3.37 3.84 4.16 4.51
   92 2229  41. 2.70 4.9746.0   .42 7.18
     3.02 3.13 3.70 4.12 4.43 4.86 5.33
   93 2232  42. 2.70 4.9765.7   .83 8.00
     2.73 2.95 3.47 3.88 4.27 4.80
   94 2236  44. 2.70 4.9767.6   .48 9.31
     3.50 3.64 4.10 4.60 5.30 5.71 6.60
   95 2240  45. 2.70 4.9766.2   .5410.15
     3.63 3.87 4.40 4.98 5.30 5.77 6.33 6.84 7.15
   96 2244  47. 2.70 4.9767.7   .9610.60
     3.27 3.75 4.30 4.65 5.20 5.72 5.90 6.45 7.03 7.45
   97 2248  48. 2.70 4.9794.9   .9311.44
     6.32
   98 2252  50. 2.70 4.97101.4  .4212.82
     6.33 6.77 7.23 8.15
   99 2256  50. 2.70 4.97113.2  .8913.23
     3.85 4.80 6.82 7.55 7.85 8.65
  100 2300  50. 2.70 4.97115.0  .0614.95
     4.85 5.20 5.93 7.05 9.53 9.96
  101 2305  53. 2.70 4.97116.1  .8615.28
     4.25 6.05 7.01 8.75 9.10
  102 2310  55. 2.70 4.97121.9  .5816.70
     5.06 6.81 7.30 8.20 8.76 9.2011.30
  103 2320  55. 2.70 4.97153.   .6618.60
     5.00 5.65
  104 2329  55. 2.70 4.97140.5  .8520.30
     5.52
```

BURTON ISL 6-7 CORRECTED

DERM	DUBM	DBEM	TDFS	DRM	V1	SVMS	CLM	SLM	SDM
33	37	37	21.15	18.30	1.440	5.24	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
81	2156	1.03	-0.12	.11	.03	.64					
82	2159	1.67	.56	.11	.03	1.02	1.32				
83	2202	2.36	.16	.11	.03	1.35	1.56	1.94			
84	2205	3.03	.08	.11	.03	1.63	1.83	1.92			
85	2208	3.73	.28	.12	.03	1.89	2.32	2.90			
86	2211	4.36	.49	.11	.03	2.14	2.50	3.23			
87	2214	5.06	.52	.11	.03	2.41	2.82	3.86			
88	2217	5.71	.04	.12	.03	2.61	3.19	4.09			
89	2220	6.39	.41	.12	.03	2.90	3.49	3.84	4.16	4.66	
90	2223	7.08	.58	.12	.03	3.17	3.73	4.17	4.59	5.02	5.32
91	2226	7.76	.44	.12	.03	3.45	3.65	3.96	4.43	4.75	5.10
92	2229	8.42	.42	.12	.03	3.59	3.70	4.27	4.69	5.00	5.43
						5.90					
93	2232	9.11	.83	.20	.04	3.80	4.02	4.54	4.95	5.34	5.87
94	2236	9.99	.48	.20	.04	4.22	4.36	4.82	5.32	6.02	6.43
						7.32					
95	2240	10.89	.54	.20	.04	4.41	4.65	5.18	5.76	6.08	6.55
						7.11	7.62	7.93			
96	2244	11.76	.96	.20	.04	4.47	4.95	5.50	5.85	6.40	6.92
						7.10	7.65	8.23	8.65		
97	2248	12.67	.93	.30	.04	7.59					
98	2252	13.57	.42	.33	.04	7.12	7.56	8.02	8.94		
99	2256	14.49	.89	.37	.04	5.15	6.10	8.12	8.85	9.15	9.95
100	2300	15.40	.06	.39	.04	5.34	5.69	6.42	7.54	10.02	10.45
101	2305	16.52	.86	.38	.04	5.53	7.33	8.29	10.03	10.38	
102	2310	17.68	.58	.40	.04	6.08	7.83	8.32	9.22	9.78	10.22
						12.32					
103	2320	19.77	.66	.51	.04	6.22	6.87				
104	2329	21.65	.85	.50	.04	6.91					

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BEAU76 8A-9A
  13.  13.  12.24.5   13. 1.44 4.1 61.    4.57 1.
  105 1850  13. 3.07 3.0745.3   .33 1.21
      .86
  107 1856  13. 3.07 3.0745.   -.28 2.95
      2.07 2.34
  108 1859  13. 3.07 3.0741.9   .17 3.12
      1.92 2.36
  109 1902  13. 3.07 3.0739.1  -.31 4.27
      2.73 3.15 3.52
  111 1910  13. 3.07 5.6245.3  -.04 5.10
      2.85 3.03 3.70
  112 1913  13. 3.07 5.6245.    .36 5.37
      2.54 2.68
  113 1916  13. 3.07 5.6245.9   .3  5.98
      2.84 3.08 3.72
  114 1920  13. 3.07 5.6248.   -.17 6.84
      3.49 3.82 4.69
  115 1923  13. 3.07 5.6248.2  -.41 7.86
      3.49
```

BEAU76 8A-9A CORRECTED

DORM	DBBM	DREM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
13	13	12	24.50	13.00	1.440	4.10	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
105	1850	1.62	.33	.08	.02	1.29					
107	1856	2.75	-0.28	.08	.02	1.89	2.16				
108	1859	3.36	.17	.07	.02	2.18	2.62				
109	1902	4.03	-0.31	.07	.02	2.50	2.92	3.29			
111	1910	5.44	-0.04	.08	.02	2.91	3.09	3.76			
112	1913	5.81	.36	.08	.02	3.00	3.14				
113	1916	6.37	.30	.09	.02	3.24	3.48	4.12			
114	1920	6.76	-0.17	.09	.02	3.43	3.76	4.62			
115	1923	7.54	-0.41	.09	.02	3.59					

```
BEAU76 8B-9B
  13.  13.  12.24.5   13. 1.44 4.1 61.    4.57 1.
  119 1946  12. 3.07 5.6244.8  -.5  2.72
      2.04
  120 1949  12. 3.07 5.6244.2   .38 2.41
      1.48
  122 1955  12. 3.07 5.6244.4   .53 3.23
      1.73 2.22 2.53
  123 1958  12. 3.07 5.6239.5  0.   4.21
      2.41
  124 2000  12. 3.07 5.6275.    .47 3.95
      1.96 2.87
  125 2006  12. 3.07 5.6247.1  -.34 5.52
      3.12 3.64 4.12
  126 2009  12. 3.07 5.6247.7   .45 5.74
      2.47 2.62 3.1  3.49
  128 2015  11. 3.07 5.6248.8  -.11 7.17
      3.28 3.57 4.48
  128 2018  11. 3.07 5.6247.7  -.2  7.98
      3.57 3.86 4.26 4.81
  132 2031  11. 3.07 5.6243.2  -.07 9.97
      3.94 4.85 5.56 6.34
  133 2034  11. 3.07 5.6268.   .1510.25
      3.84 5.44 6.25
  134 2037  11. 3.07 5.6276.4  .0710.83
      4.06 6.59
  135 2041  11. 3.07 5.6271.6  .1511.41
      4.17
  136 2045  11. 3.07 5.6273.   .4511.85
      3.86
  137 2049  11. 3.07 5.6276.5  .1912.81
      4.22 4.74 5.79 6.64
  138 2053  11. 3.07 5.6277.  -.1213.82
      4.66 4.89 7.69
  139 2057  11. 3.07 5.6276.8  .3513.55
      4.33 4.57 7.49
  140 2101  11. 3.07 5.6276.9  .0814.92
      4.73 7.98
  141 2105  11. 3.07 5.6276.7  .5215.18
      4.57 4.92 5.93
  142 2109  12. 3.07 5.6273.7  .2216.18
      5.02
```

BEAU76 8B-9B CORRECTED

DBRM	DBBM	DBEM	IDTS	DRM	V1	SVMS	CLM	SLM	SDM
13	13	12	24.50	13.00	1.440	4.10	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
119	1946	2.30	-0.50	.08	.02	1.64					
120	1949	2.87	.38	.08	.02	1.96					
122	1955	3.84	.53	.08	.02	2.36	2.85	3.16			
123	1958	4.28	0	.07	.02	2.49					
124	2000	4.59	.47	.17	.02	2.62	3.53				
125	2006	5.67	-0.34	.09	.02	2.89	3.41	3.89			
126	2009	6.28	.45	.09	.02	3.03	3.18	3.66	4.05		
128	2015	7.15	-0.11	.09	.02	3.28	3.57	4.48			
128	2018	7.87	-0.20	.09	.02	3.48	3.77	4.17	4.72		
132	2031	9.98	-0.07	.08	.02	3.96	4.87	5.58	6.36		
133	2034	10.55	.15	.15	.02	4.15	5.75	6.56			
134	2037	11.07	.07	.17	.02	4.32	6.85				
135	2041	11.72	.15	.16	.02	4.50					
136	2045	12.46	.45	.16	.02	4.49					
137	2049	13.17	.19	.17	.02	4.60	5.12	6.17	7.02		
138	2053	13.87	-0.12	.17	.02	4.73	4.96	7.76			
139	2057	14.47	.35	.17	.02	4.87	5.11	8.03			
140	2101	15.17	.08	.17	.02	5.00	8.25				
141	2105	15.87	.52	.17	.02	5.28	5.63	6.64			
142	2109	16.56	.22	.16	.02	5.42					

```
REAU76 10-11
  12.  12.   12.21.7618.3  1.44 4.9261.    4.57 1.
  143 2329   12. 2.66 2.6639.4  -.31  .60
      .55
  145 2335   12. 2.66 2.6637.4   .15 1.12
      .92
  146 2346   12. 2.66 2.6638.9   .01 1.80
      1.40
  147 2349   12. 2.66 2.6637.1   .28 2.05
      1.44
  148 2352   12. 2.65 2.6638.3   .53 2.44
      1.49
  149 2355   12. 2.66 2.6639.1  -.19 3.68
      2.45
  150 2358   12. 2.66 6.4039.3  -.29 4.53
      2.83
  151 0001   12. 2.66 6.4039.2   .32 4.54
      2.37 2.64 3.10 3.63
  152 0004   12. 2.66 6.4037.3  -.34 5.76
      3.18 3.52 3.90 4.47
  153 0007   12. 2.66 6.4045.    .34 5.61
      2.60 2.96 3.44 4.07
  154 0010   12. 2.66 6.4047.2   .27 6.43
      2.83 3.12 3.70 4.54
  155 0013   12. 2.66 6.4046.6  -.26 7.58
      3.48 3.86 4.44 5.16
  156 0017   12. 2.66 6.4047.7   .48 7.62
      2.92 3.40 4.08 4.97
  157 0020   12. 2.66 6.4045.5  -.30 9.0
      3.82 4.39 5.21 5.96
  158 0023   12. 2.66 6.4041.7  -.13 5.48
      3.79 4.33 5.29 6.0
  159 0026   12. 2.66 6.4073.0   .08 5.87
      3.63 4.32 5.38 6.08
  160 0057   12. 2.66 6.4075.2   .3916.80
      4.86
  161 0102   12. 2.66 6.40117.5  .4318.11
      8.55
  162 0106   12. 2.66 6.40114.5  .1115.54
      5.55
  163 0111   12. 2.66 6.40146.1  .4820.37
      6.46
```

REAU76 10-11 CORRECTED

DARM	DABM	DBFM	TUTS	DRM	V1	SVMS	CLM	SLM	SDM
12	12	12	21.76	18.30	1.440	4.92	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
143	2329	.38	-0.31	.09	.02	.35					
145	2335	1.35	.15	.08	.02	1.17					
146	2346	1.90	.01	.09	.02	1.52					
147	2349	2.41	.28	.08	.02	1.82					
148	2352	3.06	.53	.09	.02	2.12					
149	2355	3.58	-0.19	.09	.02	2.37					
150	2358	4.33	-0.29	.09	.02	2.65					
151	1	4.95	.32	.09	.02	2.80	3.07	3.53	4.06		
152	4	5.48	-0.34	.08	.02	2.94	3.28	3.66	4.23		
153	7	6.06	.34	.11	.02	3.07	3.43	3.91	4.54		
154	10	6.82	.27	.12	.02	3.24	3.53	4.11	4.95		
155	13	7.43	-0.26	.11	.02	3.35	3.73	4.31	5.03		
156	17	8.22	.48	.12	.02	3.54	4.02	4.70	5.59		
157	20	8.81	-0.30	.11	.02	3.65	4.22	5.04	5.79		
158	23	9.45	-0.13	.10	.02	3.78	4.32	5.28	5.99		
159	26	10.15	.08	.20	.02	3.93	4.62	5.68	6.38		
160	57	17.40	.39	.21	.02	5.48					
161	102	18.90	.43	.36	.02	9.36					
162	106	20.00	.11	.35	.02	6.03					
163	111	21.28	.48	.43	.02	7.39					

```
BEAU76 12-13
   12.  12.  15.22.9618.3  1.44 4.0861.    4.57 1.
   164 0142  12. 2.65 2.6537.2  -.07  .89
       .74
   165 0145  12. 2.65 2.6538.9  -.02 1.34
       1.15
   166 0148  11. 2.65 2.6540.1  -.04 1.87
       1.58
   167 0151  11. 2.65 2.6542.5   .57 1.80
       1.20 1.47
   168 0154  11. 2.65 2.6546.7   .06 2.62
       1.94
   169 0157  10. 2.65 2.6547.7   .53 2.87
       1.77 2.38
   171 0203  11. 2.65 5.8040.0   .69 3.77
       2.05 2.39 2.80 3.10
   172 0206  11. 2.65 5.8044.5   .10 4.08
       2.77 3.24 3.54 4.07
   173 0209  11. 2.65 5.8047.1  -.05 5.40
       3.02 3.47 3.75 4.12 4.53
   175 0214  12. 2.65 5.8044.9   .18 6.0
       3.0  3.28 3.76 4.12 4.55
   176 0217  12. 2.65 5.8047.4   .65 6.07
       2.65 3.00 3.47 3.82 4.43
   177 0220  12. 2.65 5.8046.3   .13 7.11
       3.32 3.61 4.11 4.61 5.03
   178 0223  12. 2.65 5.8044.2  -.17 8.03
       3.76 4.16 4.58 5.30 5.68
   179 0226  13. 2.65 5.8046.4   .08 8.30
       3.59 4.0  4.56 5.05 5.79
   180 0229  13. 2.65 5.8045.8  -.15 9.1
       4.0  4.42 4.87 5.62 6.12
   181 0232  13. 2.65 5.8073.5  -.14 9.56
       4.04 4.42 4.93 5.72 6.27
   182 0235  13. 2.65 5.8071.5  -.12 9.90
       2.31 4.13 5.13 5.92
   183 0238  13. 2.65 5.8070.0   .1710.47
       3.81
   184 0307  13. 2.65 5.8068.1  -.0714.91
       4.74
   185 0312  13. 2.65 5.8072.5  -.4916.21
       5.32
   186 0317  13. 2.65 5.8072.7   .6116.17
       4.38
   188 0329  13. 2.65 5.80117.5  .3518.62
       5.0
   190 0340  14. 2.65 5.80137.3 -.2021.13
       6.0
   191 0346  14. 2.65 5.80134.1  .5821.57
       5.45
```

BEAU76 12-13 CORRECTED

DPRM	DBBM	DBEM	TOTS	CRM	V1	SVMS	CLM	SLM	SDM
12	12	15	22.96	18.30	1.440	4.08	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
164	142	.88	-0.07	.06	.02	.75					
165	145	1.39	-0.02	.07	.02	1.21					
166	148	1.90	-0.04	.07	.02	1.55					
167	151	2.45	.57	.08	.02	1.86	2.13				
168	154	2.97	.06	.09	.02	2.10					
169	157	3.49	.53	.09	.02	2.41	3.02				
171	203	4.55	.69	.09	.02	2.85	3.19	3.60	3.90		
172	206	4.98	.10	.08	.02	2.97	3.44	3.74	4.27		
173	209	5.44	-0.05	.09	.02	3.08	3.53	3.81	4.18	4.59	
175	214	6.26	.18	.08	.02	3.28	3.56	4.04	4.40	4.83	
176	217	6.81	.65	.09	.02	3.41	3.76	4.23	4.58	5.19	
177	220	7.33	.13	.09	.02	3.56	3.85	4.35	4.85	5.27	
178	223	7.94	-0.17	.08	.02	3.69	4.09	4.51	5.23	5.61	
179	226	8.47	.08	.09	.02	3.78	4.19	4.75	5.24	5.98	
180	229	9.03	-0.15	.08	.02	3.95	4.37	4.82	5.57	6.07	
181	232	9.58	-0.14	.16	.02	4.08	4.46	4.97	5.76	6.31	
182	235	9.94	-0.12	.16	.02	2.37	4.19	5.19	5.98		
183	238	10.79	.17	.15	.02	4.15					
184	307	14.99	-0.07	.15	.02	4.84					
185	312	15.88	-0.49	.16	.02	5.01					
186	317	16.84	.61	.16	.02	5.17					
188	329	19.26	.35	.29	.02	5.66					
190	340	21.27	-0.20	.34	.02	6.17					
191	346	22.48	.58	.33	.02	6.39					

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BEAU76 16-17
  12.  12.  14.20.0512.   1.44 4.9261.   4.57 1.
 201 0906  12. 1.91 1.9142.9   .22  .10
     .08
 202 0909  12. 1.91 1.9139.1   .19  .61
     .48
 203 0912  12. 1.91 1.9141.2   .50  .84
     .55  .63  .77
 204 0915  12. 1.91 1.9143.7   .69 1.24
     .78  .84 1.04 1.17
 205 0918  12. 1.91 3.3241.9   .47 2.13
    1.38 1.53 1.65 1.78 1.95
 206 0921  12. 1.91 3.3237.6   .36 2.88
    1.91 2.05 2.26 2.49 2.67
 207 0924  12. 1.91 3.3247.3   .09 3.69
    2.35 2.47 2.59 2.84 3.07
 208 0927  12. 1.91 3.3247.2   .55 3.80
    2.16 2.26 2.33 2.66 2.76 2.86 3.04
 210 0932  12. 1.91 3.3246.8  -.07 5.46
    2.97 3.63 4.55 4.73 5.01
 211 0935  12. 1.91 3.3246.9  -.25 6.33
    3.33 3.52 4.14 4.34 4.49 4.85 5.18 5.30
 212 0938  12. 1.91 3.3274.1   .15 6.47
    3.03 3.38 3.51 3.58 3.70 4.14 4.43 5.58 5.78
 213 0941  12. 1.91 3.3272.0   .47 6.75
    2.87 3.31 3.61 3.80 4.35 4.99
 214 0946  12. 1.91 3.3273.9   .55 7.81
    3.07 3.65 3.73 4.01 4.49 4.75 4.84 5.64 6.26
 215 0951  12. 1.91 3.32116.2  .06 9.15
    3.72 4.16 4.45 4.74 4.98 5.26 5.50 6.07
 216 0956  12. 1.91 3.32115.4  .90 9.58
    3.52 4.29 4.39 5.01 7.08
 217 1002  12. 1.91 3.32111.8  .0211.58
    4.41 4.64 4.90 5.55 5.75 6.02 6.81 7.84
 219 1016  13. 1.91 3.32142.3  .5613.94
    4.25 4.66 5.07 7.77
 220 1029  14. 1.91 3.32188.6 -.1617.31
    5.62 5.93
 221 1043  14. 1.91 3.32188.1  .1019.95
    6.02 6.23 6.34 8.63
```

BEAU76 16-17 CORRECTED

DORM	DBBM	DREM	TDIS	DRM	V1	SVMS	CLM	SLM	SDM
12	12	14	20.05	12.00	1.440	4.92	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
201	906	.42	.22	.10	.01	.41					
202	909	.89	.19	.09	.01	.77					
203	912	1.44	.50	.10	.01	1.16	1.24	1.38			
204	915	2.03	.69	.10	.01	1.59	1.65	1.85	1.98		
205	918	2.70	.47	.10	.02	1.96	2.11	2.23	2.36	2.53	
206	921	3.32	.36	.08	.02	2.37	2.51	2.72	2.95	3.13	
207	924	3.90	.09	.12	.02	2.57	2.69	2.81	3.06	3.29	
208	927	4.47	.55	.12	.02	2.84	2.94	3.01	3.34	3.44	3.54
						3.72					
210	932	5.50	-0.07	.11	.02	3.03	3.69	4.61	4.79	5.07	
211	935	6.19	-0.25	.11	.02	3.21	3.40	4.02	4.22	4.37	4.73
						4.98	5.18				
212	938	6.83	.15	.21	.02	3.40	3.75	3.88	3.95	4.07	4.51
						4.80	5.87	6.15			
213	941	7.42	.47	.20	.02	3.56	4.00	4.30	4.49	5.04	5.68
214	946	8.57	.55	.21	.02	3.84	4.42	4.50	4.78	5.26	5.52
						5.61	6.41	7.03			
215	951	9.56	.06	.35	.02	4.15	4.59	4.88	5.17	5.41	5.69
						5.93	6.50				
216	956	10.75	.90	.35	.02	4.78	5.55	5.65	6.27	8.34	
217	1002	11.94	.02	.34	.02	4.78	5.01	5.27	5.92	6.12	6.39
						7.18	8.21				
219	1016	14.94	.56	.44	.02	5.27	5.68	6.09	8.79		
220	1029	17.75	-0.16	.60	.02	6.08	6.39				
221	1043	20.65	.10	.60	.02	6.73	6.94	7.05	9.34		

```
BEAU76 18-19
  15.  15.  14.28.5 14.    1.44 4.9861.    4.57 1.
  225 0554  15. 1.94 1.9444.0  -.18 1.62
      1.33
  226 0557  15. 1.94 1.9440.8   .37 1.57
      1.24
  227 0600  16. 1.94 2.5941.9   .33 2.27
      1.69
  228 0603  16. 1.94 2.5940.9  -.34 3.56
      2.70
  229 0606  17. 1.94 2.5939.3   .43 3.43
      2.36
  230 0609  17. 1.94 2.5940.7  -.30 4.83
      3.41
  231 0612  17. 1.94 2.5938.7  -.42 5.61
      3.82
  232 0615  18. 1.94 2.5944.0   .72 5.10
      2.93
  233 0618  18. 1.94 2.5939.3   .74 5.75
      3.14
  234 0621  18. 1.94 2.5940.4   .41 6.71
      3.66
  235 0624  18. 1.94 2.5939.6   .21 7.57
      4.05
  236 0627  18. 1.94 2.5943.6   .06 8.35
      4.30
  237 0630  18. 1.94 2.5943.0   .39 8.67
      4.14
  238 0633  18. 1.94 2.5944.9   .88 8.85
      3.82
  239 0636  17. 1.94 2.5944.1  -.0410.40
      4.88
  240 0639  17. 1.94 2.5945.1   .4110.58
      4.65
  242 0644  16. 1.94 2.5948.1   .3811.58
      4.84
  243 0647  16. 1.94 2.5949.8   .3912.20
      5.01
  244 0650  16. 1.94 2.5950.1   .3912.79
      5.17
  246 0655  16. 1.94 2.5985.3   .2113.90
      5.52
  247 0658  16. 1.94 2.5983.7   .8013.93
      5.08
  248 0701  16. 1.94 2.5972.8   .7214.69
      5.35
  249 0704  16. 1.94 2.5969.7   .4715.65
      5.78
  250 0707  16. 1.94 2.5972.7   .1816.44
      6.21
  251 0711  16. 1.94 2.5982.9   .7016.87
      5.68
  252 0715  16. 1.94 2.5982.9  -.0618.36
      6.71
```

BEAU75 18-19 CORRECTED

DBRM	DBBM	DBFM	TDIS	DRM	V1	SVMS	CLM	SLM	SDM
15	15	14	28.50	14.00	1.440	4.98	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
225	554	1.63	-0.10	.11	.01	1.35					
226	557	2.04	.37	.10	.01	1.72					
227	600	2.70	.33	.10	.02	2.14					
228	603	3.32	-0.34	.10	.02	2.47					
229	606	3.95	.43	.09	.02	2.90					
230	609	4.63	-0.30	.10	.02	3.22					
231	612	5.28	-0.42	.09	.02	3.51					
232	615	5.93	.72	.11	.02	3.77					
233	618	6.58	.74	.09	.02	3.99					
234	621	7.21	.41	.09	.02	4.18					
235	624	7.87	.21	.09	.02	4.37					
236	627	8.52	.06	.11	.02	4.48					
237	630	9.16	.39	.10	.02	4.65					
238	633	9.84	.88	.11	.02	4.83					
239	636	10.47	-0.04	.11	.02	4.96					
240	639	11.10	.41	.11	.02	5.19					
242	644	12.08	.38	.12	.02	5.36					
243	647	12.72	.39	.13	.02	5.54					
244	650	13.31	.39	.13	.02	5.71					
246	655	14.36	.21	.25	.02	6.00					
247	658	14.97	.80	.24	.02	6.14					
248	701	15.62	.72	.21	.02	6.29					
249	704	16.32	.47	.20	.02	6.46					
250	707	16.83	.18	.21	.02	6.61					
251	711	17.81	.70	.24	.02	6.64					
252	715	18.54	-0.06	.24	.02	6.91					

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BEAU76 20-21
  14.  14.  14.15.2614.   1.44 5.2 61.   4.57 1.
  268 1145  14. 1.83 1.8340.7   .19  .81
       .61  .66
  269 1148  14. 1.83 1.8340.3   .83  .82
       .51  .57  .64  .69
  270 1151  14. 1.83 4.1240.8  1.10 1.22
       .74  .85  .97
  271 1154  14. 1.83 4.1238.8   .25 2.43
      1.77 1.88 1.99 2.11
  272 1157  14. 2.85 4.1238.8   .66 2.84
      1.65 1.93 2.08 2.31
  273 1200  14. 1.83 4.1239.9   .09 3.92
      2.39 2.46 2.62 2.92
  274 1203  14. 1.83 4.1240.5   .35 4.39
      2.34 2.77 3.47
  275 1206  14. 1.83 4.1241.6   .20 5.08
      2.72 3.07 4.20
  276 1209  14. 1.83 4.1241.1   .15 5.85
      3.00 3.45 3.52 3.58 4.02 4.78
  277 1212  14. 1.83 4.1245.4   .09 6.57
      3.60 4.08
  278 1215  14. 1.83 4.1245.0   .07 7.22
      3.57 4.00 4.25 4.72 5.48
  279 1218  13. 1.83 4.1246.8   .04 7.89
      3.79 3.89 4.21 4.37 5.25
  280 1221  13. 1.83 4.1243.5   .02 8.59
      4.00 4.25 4.75 4.92 5.57 5.87
  281 1224  13. 1.83 4.1245.1   .09 9.18
      4.14 4.41 5.05 5.48 5.69 6.10
  282 1227  13. 1.83 4.1245.9   .09 9.85
      4.38 5.30 5.75 6.28 6.62
  283 1230  12. 1.83 4.1273.6   .1210.45
      4.50 5.23 5.52 5.66 7.26
  284 1233  12. 1.83 4.1272.7   .0411.13
      4.78 5.29 5.38 5.74 6.48
  285 1236  13. 1.83 4.1272.0   .0711.75
      4.91 5.52 5.79 5.97 6.22
  286 1239  13. 1.83 4.1273.8   .0312.43
      5.17 5.87 6.44 7.27 7.55 7.77 8.44
  287 1242  13. 1.83 4.12141.9  .0413.43
      5.30 5.50 5.80 5.94 7.12 8.45
  288 1245  13. 1.83 4.12142.0  .0813.89
      5.48 5.59 6.67 7.55 8.90
  289 1250  14. 1.83 4.12142.0  .0015.26
      6.01 6.93 7.30 8.11 8.42
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BEAU76 20-21 CORRECTED

DBRM	DHBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
14	14	14	15.26	14.00	1.440	5.20	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
268	1145	1.10	.19	.10	.01	.91	.96				
269	1148	1.75	.83	.10	.01	1.45	1.51	1.58	1.63		
270	1151	2.42	1.10	.10	.02	1.96	2.07	2.19			
271	1154	2.78	.25	.10	.02	2.13	2.24	2.35	2.47		
272	1157	3.60	.66	.10	.02	2.42	2.70	2.85	3.08		
273	1200	4.11	.09	.10	.02	2.60	2.67	2.83	3.13		
274	1203	4.84	.35	.10	.02	2.81	3.24	3.94			
275	1206	5.39	.20	.11	.02	3.04	3.39	4.52			
276	1209	6.10	.15	.10	.02	3.27	3.72	3.79	3.85	4.29	5.05
277	1212	6.78	.09	.12	.02	3.83	4.31				
278	1215	7.41	.07	.12	.02	3.78	4.21	4.46	4.93	5.69	
279	1218	8.05	.04	.12	.02	3.97	4.07	4.39	4.55	5.43	
280	1221	8.72	.02	.11	.02	4.15	4.40	4.90	5.07	5.72	6.02
281	1224	9.39	.09	.12	.02	4.37	4.64	5.28	5.63	5.92	6.33
282	1227	10.06	.09	.12	.02	4.61	5.53	5.98	6.51	6.85	
283	1230	10.79	.12	.22	.02	4.86	5.59	5.88	6.02	7.62	
284	1233	11.39	.04	.22	.02	5.05	5.56	5.65	6.01	6.75	
285	1236	12.03	.07	.21	.02	5.21	5.82	6.09	6.27	6.52	
286	1239	12.68	.03	.22	.02	5.44	6.14	6.71	7.54	7.82	8.04
						8.71					
287	1242	13.94	.04	.47	.02	5.82	6.02	6.32	6.46	7.64	8.97
288	1245	14.44	.08	.47	.02	6.05	6.16	7.24	7.92	9.47	
289	1250	15.73	0	.47	.02	6.50	7.42	7.79	8.60	8.91	

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BEAU76 22A-23
   19.  19.  20.21.0918.3  1.44 4.7461.    4.57 1.
   305 0506  19. 2.16 2.1640.8    .15  .64
        .58
   306 0509  19. 2.16 2.1639.9    .05 1.18
       1.00
   307 0512  19. 2.16 2.1640.4  -.32 1.96
       1.72
   308 0515  19. 2.16 2.1640.   -.54 2.57
       2.18
   309 0518  19. 2.16 2.1640.    .05 2.44
       1.87 2.33
   310 0521  19. 2.16 2.1639.    .15 2.87
       2.08 2.4
   311 0524  19. 2.16 5.8541.7    .06 3.52
       2.45 3.04
   312 0527  19. 2.16 5.8540.4  -.18 4.34
       2.89 3.63
   313 0530  19. 2.16 5.8540.4    .11 4.60
       2.71 3.61 4.38
   314 0533  19. 2.16 5.8539.7  -.31 5.58
       3.25 3.68 4.44 5.05
   315 0536  19. 2.16 5.8539.2  -.17 6.02
       3.25 3.72 4.64 5.74
   316 0539  19. 2.16 5.8539.3    .53 5.89
       3.23 4.06 5.64
   317 0542  19. 2.16 5.8540.   -.08 7.05
       3.47 3.89 4.21 6.09 6.74
   318 0545  19. 2.16 5.8541.1    .42 7.04
       2.99 3.6  3.95 6.41
   319 0548  19. 2.16 5.8542.2    .31 7.65
       3.28 3.84 4.2  5.58 6.3
   320 0551  19. 2.16 5.8543.1    .32 8.27
       3.41 3.97 4.47 5.32 6.93
   321 0554  19. 2.16 5.8542.1  -.22 9.39
       4.05 5.12 6.12 7.22 8.72
   322 0557  19. 2.16 5.8542.9    .32 9.45
       3.66 4.75 5.2  5.93 7.06
   323 0600  19. 2.16 5.8544.9    .41 9.96
       3.68 4.29 4.66 5.42 5.97 6.87
   324 0603  19. 2.16 5.8542.6  -.2911.32
       4.61 4.95 5.37 5.56 6.11 7.37
   325 0606  19. 2.16 5.8554.6    .4111.19
       4.   5.   5.42 6.19
   326 0609  19. 2.16 5.8568.   -.1612.35
       4.70 5.16 6.47 7.47 8.69 9.21
   327 0612  19. 2.16 5.8568.3  -.1512.96
       4.87 5.53 6.26 7.02 7.8410.25
   328 0615  19. 2.16 5.8568.9    .1813.19
       4.72 5.41 6.   6.44 9.
   330 0622  19. 2.16 5.8577.7    .2514.58
       4.93 5.43 5.87 6.72

   331 0625  19. 2.16 5.8582.5    .3215.16
       5.06 5.61 8.07
   332 0628  19. 2.16 5.8581.3  -.3516.45
       5.89 6.0912.82
   333 0631  18. 2.16 5.8578.8    .0716.65
       5.6211.61
   334 0634  18. 2.16 5.8572.4  -.1117.49
       6.01
   335 0637  18. 2.16 5.8572.2    .2817.76
       5.8  5.97 6.31 6.82 7.86

   336 0640  18. 2.16 5.8572.     .2418.39
       5.98 6.85 7.08 7.72 8.84 9.5 11.82
   337 0643  18. 2.16 5.85112.2  .4218.68
       7.07 7.8412.4213.3516.12
   338 0646  19. 2.16 5.85112.4  .0519.69
       6.43 7.74
   339 0650  20. 2.16 5.85166.2 -.3120.78
       6.48 8.11 9.44 9.9310.1211.6512.15
   340 0655  20. 2.16 5.85134.5  .4821.89
       6.37 6.56 8.12 8.5110.8112.67

BEAU76 22B-23
   20.  20.  20.22.6018.3  1.44 4.5661.    4.57 1.
   341 0736  20. 1.94 1.94135.  -.62  .86
        .75
   342 0741  20. 1.94 1.94135.   .46  .81
        .44  .62
   343 0751  20. 1.94 3.36190.  -.14 3.28
       2.21 2.64
   344 0759  20. 1.94 3.36192.3  .01 4.75
       2.72 3.25
   345 0805  20. 1.94 3.36190.3 -.29 6.48
       3.43
   346 0813  20. 1.94 3.36192.9  .50 7.38
       3.08
   347 0820  20. 1.94 3.36188.5 -.07 9.67
       4.18
   348 0832  20. 1.94 3.36265.7  .1810.74
       4.10
   349 0846  19. 1.94 3.36340.  -.1413.39
       4.80
   350 0904  19. 1.94 3.36195.8 -.1517.44
       6.16
   351 0929  20. 1.94 3.36192.9 -.4222.60
       7.70
```

BFAU76 22A-23 CORRECTED

DBRM	DBBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
19	19	20	21.09	18.30	1.440	4.74	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
305	506	.88	.15	.09	.02	.84					
306	509	1.32	.05	.09	.02	1.16					
307	512	1.73	-0.32	.09	.02	1.51					
308	515	2.12	-0.54	.09	.02	1.75					
309	518	2.58	.05	.09	.02	2.03	2.49				
310	521	3.10	.15	.08	.02	2.33	2.65				
311	524	3.67	.06	.09	.03	2.63	3.22				
312	527	4.25	-0.18	.09	.03	2.82	3.56				
313	530	4.80	.11	.09	.03	2.93	3.83	4.60			
314	533	5.36	-0.31	.09	.03	3.05	3.48	4.24	4.85		
315	536	5.93	-0.17	.08	.03	3.19	3.66	4.58	5.68		
316	539	6.50	.53	.08	.03	3.87	4.70	6.28			
317	542	7.06	-0.08	.09	.03	3.45	3.92	4.24	6.12	6.77	
318	545	7.55	.42	.09	.03	3.53	4.14	4.49	6.95		
319	548	8.05	.31	.09	.03	3.71	4.27	4.63	6.01	6.73	
320	551	8.69	.32	.10	.03	3.85	4.41	4.91	5.76	7.37	
321	554	9.26	-0.22	.09	.03	3.95	5.02	6.02	7.12	8.62	
322	557	9.87	.32	.10	.03	4.10	5.19	5.64	6.37	7.50	
323	600	10.47	.41	.10	.03	4.22	4.83	5.20	5.96	6.51	7.41
324	603	11.13	-0.29	.10	.03	4.44	4.78	5.15	5.39	5.94	7.20
325	606	11.74	.41	.14	.03	4.57	5.57	5.99	6.76		
326	609	12.37	-0.16	.18	.03	4.74	5.20	6.51	7.51	8.73	9.25
327	612	12.99	-0.15	.18	.03	4.92	5.58	6.31	7.07	7.89	10.30
328	615	13.55	.18	.18	.03	5.11	5.80	6.39	6.83	9.39	
330	622	15.04	.25	.21	.03	5.42	5.92	6.36	7.21		
331	625	15.71	.32	.23	.03	5.63	6.18	8.64			
332	628	16.32	-0.35	.22	.03	5.79	5.99	12.72			
333	631	16.93	.07	.21	.02	5.93	11.92				
334	634	17.57	-0.11	.19	.02	6.12					
335	637	18.23	.28	.19	.02	6.30	6.47	6.81	7.32	7.56	
336	640	18.82	.24	.19	.02	6.44	7.31	7.54	8.18	8.50	9.96
						12.28					
337	643	19.42	.42	.32	.02	7.84	8.61	13.19	14.12	16.89	
338	646	20.06	.05	.32	.03	6.83	8.14				
339	650	20.89	-0.31	.50	.03	6.62	8.33	9.66	10.15	10.34	11.87
						12.37					
340	655	21.97	.48	.40	.03	7.27	7.46	9.02	9.41	11.71	13.52

BFAU76 22B-23 CORRECTED

DBRM	DBBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
20	20	20	22.60	18.30	1.440	4.56	61.00	4.507	01.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
341	736	.85	-0.62	.61	.02	.76					
342	741	1.88	.46	.61	.02	1.53	1.71				
343	751	3.87	-0.14	.73	.02	2.82	3.25				
344	759	5.50	.01	.74	.02	3.49	4.02				
345	805	6.84	-0.29	.73	.02	3.89					
346	813	8.54	.50	.74	.02	4.34					
347	820	10.33	-0.07	.73	.02	4.86					
348	832	11.85	.18	.93	.02	5.23					
349	846	14.38	-0.14	1.13	.02	5.82					
350	904	18.04	-0.15	.75	.02	6.79					
351	929	22.92	-0.42	.74	.02	8.04					

```
BEAU76 24A-25
   17.  17.   16.44.63  17. 1.44 4.8261.    4.57 1.
   352 0311   17. 1.99 1.9939.0   -.12 1.37
       1.26
   353 0314   17. 1.99 1.9942.2    .32 1.14
       1.01
   354 0317   17. 1.99 1.9940.2    .03 2.05
       1.76
   355 0320   18. 1.99 1.9939.8    .07 2.63
       2.11 2.28
   356 0323   18. 1.99 3.3440.1    .12 3.21
       2.33 2.52
   357 0326   18. 1.99 3.3439.8    .12 3.82
       2.66 2.87
   358 0329   18. 1.99 3.3441.7   -.13 4.65
       3.15 3.32 3.5
   359 0332   18. 1.99 3.3439.8    .12 4.84
       2.97 3.72
   360 0335   18. 1.99 3.3439.4    .06 5.7
       3.47 4.38
   361 0338   18. 1.99 3.3439.6   -.21 6.6
       4.01 4.28 5.13
   362 0341   18. 1.99 3.3440.6    .46 6.56
       3.68 5.23
   363 0344   18. 1.99 3.3436.2   -.35 8.03
       4.72 5.86
   364 0347   18. 1.99 3.3445.8    .33 7.91
       3.89 6.19
   365 0350   18. 1.99 3.3444.4   -.01 8.91
       4.38 5.32 6.07 6.74
   366 0353   18. 1.99 3.3444.3   -.26 9.74
       4.86 5.87 6.47 7.67
   367 0356   18. 1.99 3.3445.   -.9510.13
       4.60
   368 0359   18. 1.99 3.3455.8   .0816.55
       4.73 6.77
   369 0402   18. 1.99 3.3459.   -.3811.63
       5.31 8.97
   370 0405   18. 1.99 3.3458.9   -.2812.1
       5.43 6.88
   371 0408   19. 1.99 3.3472.3   -.3312.7
       5.52
   372 0411   19. 1.99 3.3473.2    .1912.83
       5.27 8.53
   373 0414   19. 1.99 3.3470.6    .3713.26
       5.18 9.1
   374 0417   19. 1.99 3.3483.3   -.4214.6
       6.06 7.55
   375 0420   19. 1.99 3.3486.9   -.4615.3
       6.06
```

```
   376 0423   19. 1.99 3.3484.6    .0415.54
       6.07
   377 0427   19. 1.99 3.3470.7    .4615.75
       6.66
   378 0430   19. 1.99 3.3472.3    .4316.28
       5.76
   379 0433   19. 1.99 3.34110.6   .0517.16
       6.45
   380 0437   18. 1.99 3.34141.3  -.2218.15
       6.64 7.13 7.36
   381 0442   18. 1.99 3.34133.4   .1518.83
       6.72 6.88
   382 0517   18. 1.99 3.34137.7   .0821.70
       7.42
   383 0521   18. 1.99 3.34138.5  -.1322.75
       7.87 8.48
   384 0525   18. 1.99 3.34138.2 0.   23.51
       7.52
   385 0536   18. 1.99 3.3463.     .0925.56
       8.52 9.21

BEAU76 24B-25
   17.  17.   16.24.60  17. 1.44 4.8261.    4.57 1.
   383 0521   18. 2.27 2.27138.5 -.12 1.31
        .83
   384 0525   18. 2.27 2.27138.2  .00 2.14
       1.35
   385 0536   18. 2.27 6.02163.   .09 4.31
       2.40
   386 0547   18. 2.27 6.02192.1 -.04 6.50
       3.09
   387 0555   18. 2.27 6.02192.3  .35 7.77
       3.15
   388 0604   18. 2.27 6.02182.7  .14 9.97
       3.84
   389 0617   18. 2.27 6.02208.4  .0612.79
       4.51
   390 0630   18. 2.27 6.02210.   .0515.65
       5.17
   391 0647   18. 2.27 6.02211.2  .0519.35
       6.01
   392 0706   16. 2.27 6.02217.8 -.0223.50
       7.14
   393 0723   16. 2.27 6.02313.   .0127.60
       7.89
```

BEAU76 24A-25 CORRECTED

DBRM	DBBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
17	17	16	44.63	17.00	1.440	4.82	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
352	311	1.14	-0.32	.09	.02	1.04					
353	314	1.56	.32	.10	.02	1.44					
354	317	2.17	.03	.09	.02	1.90					
355	320	2.79	.07	.09	.02	2.28	2.45				
356	323	3.42	.12	.09	.02	2.56	2.75				
357	326	4.03	.12	.09	.02	2.89	3.10				
358	329	4.61	-0.13	.09	.02	3.14	3.31	3.49			
359	332	5.25	.32	.09	.02	3.40	4.15				
360	335	5.85	.06	.09	.02	3.64	4.55				
361	338	6.48	-0.21	.09	.02	3.91	4.18	5.03			
362	341	7.11	.46	.09	.02	4.25	5.80				
363	344	7.76	-0.35	.08	.02	4.47	5.61				
364	347	8.34	.33	.10	.02	4.34	5.64				
365	350	9.00	-0.01	.10	.02	4.50	5.44	6.19	6.86		
366	353	9.58	-0.26	.10	.02	4.73	5.74	6.29	7.54		
367	356	10.19	-0.05	.11	.02	4.68					
368	359	10.77	.08	.14	.02	4.97	7.01				
369	402	11.40	-0.38	.15	.02	5.10	8.76				
370	405	11.97	-0.28	.15	.02	5.32	6.77				
371	408	12.57	-0.33	.20	.02	5.41					
372	411	13.22	.19	.20	.02	5.68	8.94				
373	414	13.82	.37	.19	.02	5.76	9.68				
374	417	14.41	-0.42	.23	.02	5.90	7.39				
375	420	15.09	-0.46	.25	.02	5.87					
376	423	15.82	.04	.24	.02	6.37					
377	427	16.40	.46	.19	.02	7.33					
378	430	16.91	.43	.20	.02	6.41					
379	433	17.53	.05	.32	.02	6.85					
380	437	18.16	-0.22	.43	.02	6.87	7.36	7.59			
381	442	19.38	.15	.40	.02	7.29	7.45				
382	517	22.20	.08	.42	.02	7.94					
383	521	23.04	-0.13	.42	.02	8.18	8.79				
384	525	23.93	0	.42	.02	7.96					
385	536	26.15	.09	.50	.02	9.13	9.82				

BEAU76 24B-25 CORRECTED

DBRM	DBBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
17	17	16	24.60	17.00	1.440	4.82	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
383	521	1.61	-0.12	.42	.02	1.15					
384	525	2.56	0	.42	.02	1.79					
385	536	4.90	.09	.50	.02	3.01					
386	547	7.06	-0.04	.60	.02	3.67					
387	555	8.72	.35	.60	.02	4.12					
388	604	10.68	.14	.57	.02	4.57					
389	617	13.50	.06	.65	.02	5.25					
390	630	16.36	.05	.66	.02	5.90					
391	647	20.06	.05	.66	.02	6.74					
392	706	24.16	-0.02	.68	.02	7.83					
393	723	28.61	.01	1.00	.02	8.92					

```
BEAU76 26A-27A
  17.  17.   18.37.6 17.0  1.44 4.7061.    4.57 1.
  394 1011   17. 2.01 2.0136.0  -.29  .65
       .61
  396 1017   18. 2.01 2.0141.5  -.11 1.69
      1.40
  397 1020   18. 2.01 2.9039.0   .15 2.10
      1.52
  398 1023   18. 2.01 2.9039.1  -.42 3.19
      2.44
  399 1026   19. 2.01 2.9037.7  -.29 3.69
      2.61
  400 1029   19. 2.01 2.9040.2  -.02 3.93
      2.59
  401 1032   19. 2.01 2.9041.0  -.39 4.94
      3.22
  402 1035   19. 2.01 2.9039.6  -.28 5.41
      3.32
  403 1038   20. 2.01 2.9030.0   .02 5.63
      3.21
  404 1041   20. 2.01 2.9039.3  -.19 6.46
      3.62
  405 1044   20. 2.01 2.9039.9  -.19 7.03
      3.81
  406 1047   21. 2.01 2.9041.6   .05 7.36
      3.76
  407 1050   21. 2.01 2.9042.0  -.42 8.45
      4.45
  408 1053   21. 2.01 2.9040.1  -.21 8.74
      4.45
  409 1056   21. 2.01 2.9041.0  -.29 9.39
      4.71
  410 1059   21. 2.01 2.9054.0  -.3910.06
      4.99
  413 1106   22. 2.01 2.9055.7   .0111.09
      4.74
  414 1109   23. 2.01 2.9068.1  -.2011.80
      5.04
  415 1112   23. 2.01 2.9069.5  -.3712.54
      5.26
  416 1115   23. 2.01 2.9069.3  -.4413.30
      5.47
99999
  17.  17.   18.37.6 17.   1.44 5.0761.    4.57 1.
  417 1158   23. 2.01 2.9081.5  -.3516.29
      5.40
  418 1202   23. 2.01 2.9076.6  -.0216.84
      9.70
  419 1205   22. 2.01 2.9074.0   .0317.47
      9.94
  420 1208   22. 2.01 2.9067.0  -.1718.37
     10.33
  421 1213   22. 2.01 2.90121.0 -.2419.40
     10.71
  422 1218   22. 2.01 2.90100.5 -.5820.83
     11.54
  423 1222   22. 2.01 2.90103.3 -.0121.17
     11.56
  424 1226   22. 2.01 2.90130.6 -.6522.56
     12.62
```

BEAU76 26A-27A CORRECTED

DBRM	DUBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
17	17	18	37.60	17.00	1.440	4.70	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
394	1011	.43	-0.29	.07	.01	.41					
396	1017	1.67	-0.11	.09	.02	1.40					
397	1020	2.23	.15	.08	.02	1.77					
398	1023	2.85	-0.42	.08	.02	2.12					
399	1026	3.47	-0.29	.08	.02	2.42					
400	1029	4.00	-0.02	.09	.02	2.68					
401	1032	4.64	-0.39	.09	.02	2.94					
402	1035	5.21	-0.28	.08	.02	3.15					
403	1038	5.70	.02	.05	.01	3.29					
404	1041	6.35	-0.19	.08	.02	3.53					
405	1044	6.93	-0.19	.09	.02	3.73					
406	1047	7.50	.05	.09	.02	3.92					
407	1050	8.12	-0.42	.09	.02	4.14					
408	1053	8.62	-0.21	.09	.02	4.35					
409	1056	9.19	-0.29	.09	.02	4.53					
410	1059	9.80	-0.39	.13	.02	4.75					
413	1106	11.24	.01	.14	.02	4.91					
414	1109	11.78	-0.20	.18	.02	5.04					
415	1112	12.35	-0.37	.18	.02	5.09					
416	1115	13.04	-0.44	.18	.02	5.23					

BEAU76 26A-27A

DBRM	DBBM	DBEM	TDTS	DRM	V1	SVMS	CLM	SLM	SDM
17	17	18	37.60	17.00	1.440	5.07	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOR	G1	G2	G3	G4	G5	G6
417	1158	16.18	-0.35	.24	.02	5.31					
418	1202	17.04	-0.02	.22	.02	9.93					
419	1205	17.72	.03	.22	.02	10.21					
420	1208	18.39	-0.17	.19	.02	10.37					
421	1213	19.54	-0.24	.38	.02	10.87					
422	1218	20.56	-0.58	.31	.02	11.29					
423	1222	21.49	-0.01	.32	.02	11.89					
424	1226	22.32	-0.65	.41	.02	12.41					

```
REAU76 26B-27B
   23.   23.   18.23.9218.    1.44 5.3061.    4.57 1.
  417 1158  23. 2.34 2.3481.5   -.35   .98
        .89
  418 1202  23. 2.34 2.3476.6   -.62 1.47
       1.27
  419 1205  22. 2.34 2.3474.0    .03 2.01
       1.64
  420 1208  22. 2.54 2.3467.8   -.17 2.82
       2.20
  421 1213  22. 2.34 4.23121.0 -.24 3.94
       2.59
  422 1218  22. 2.34 4.23100.5 -.56 5.42
       3.41
  423 1222  22. 2.34 4.23103.3 -.01 5.79
       3.16
  424 1226  22. 2.34 4.23130.6 -.65 7.31
       4.80
  425 1230  22. 2.34 4.23131.6 -.73 8.33
       4.39
  426 1236  21. 2.34 4.23129.1 -.51 9.04
       4.55
  427 1239  21. 2.34 4.23127.1 -.5710.29
       4.94
  428 1243  20. 2.34 4.23126.0 -.2210.88
       4.87
  429 1254  19. 2.34 4.23188.4 -.2213.82
       5.22
  430 1304  19. 2.34 4.23178.4  .1714.98
       5.36
  431 1321  18. 2.34 4.23263.3 -.1818.86
       6.20
  432 1340  18. 2.34 4.23263.6 -.1323.13
       7.82
```

REAU76 26B-27B CORRECTED

DBRM	DUBM	DBEM	TOTS	DRM	V1	SVMS	CLM	SLM	SOM
23	23	18	23.92	18.00	1.440	5.30	61.00	4.57	1.00

SHOT	TIME	DISTS	TS	TC	TCOP	G1	G2	G3	G4	G5	G6
417	1158	.88	-0.35	.25	.02	.92					
418	1202	1.69	-0.02	.24	.02	1.51					
419	1205	2.27	.03	.23	.02	1.92					
420	1208	2.85	-0.17	.20	.02	2.25					
421	1213	4.10	-0.24	.40	.03	2.78					
422	1218	5.16	-0.58	.32	.03	3.18					
423	1222	6.11	-0.01	.33	.03	3.51					
424	1226	7.10	-0.65	.44	.03	3.81					
425	1230	8.04	-0.73	.44	.03	4.12					
426	1234	8.96	-0.51	.43	.03	4.50					
427	1239	10.14	-0.57	.42	.03	4.82					
428	1243	11.00	-0.22	.42	.03	5.09					
429	1254	13.42	-0.22	.62	.02	5.64					
430	1304	15.76	.17	.61	.02	6.17					
431	1321	19.60	-0.18	.92	.02	6.97					
432	1340	23.92	-0.13	.92	.02	7.84					

III

COMPUTER PROGRAMS TO PLOT DATA (REFPLOTT, REDPLOT2) AND PROGRAM TO COMPUTE STRUCTURE (MULTLAY)

```
      PROGRAM REFPLOTT
      DIMENSION XAXIS(5),YAXIS(3),SHOT(1),AT(11),R(4)
      INTEGER PLOTEND,PSUP,PSDOWN,PENUP,PENDOWN
      PLOTEND=-3 $ PSUP=-1 $ PSDOWN=-2
      PENUP=3 $ PENDOWN=2
      XAXIS(1)=8HDISTANCE
      XAXIS(2)=8H 2 SEC P
      XAXIS(3)=8HER INCH
      YAXIS(1)=8HTIME 1 S
      YAXIS(2)=8HEC PER I
      YAXIS(3)=8HNCH
      READ(5,8) XAXIS(4),XAXIS(5)
    8 FORMAT(A8,A8,)
      READ(5,9)TDTS
    9 FORMAT(15X,F5.2)
      NX=TDTS/2.+4.
      IF(NX.LT.13)NX=13
      NXAXIS=40
      NYAXIS=24
      CALL PLOTINT(-6.,6.,10)
      CALL PLOT(28.,0.,PLOTEND)
      CALL ROTATEXY
      DO 10 I=1,NX
      X=I
   10 CALL PLOTSYMB(X,0.,.20,13,0.,PSDOWN)
C GO BACK TO (4,-1)
      CALL PLOTSYMB(4.,-1.,.25,XAXIS,0.,NXAXIS)
      CALL PLOT(0.,0.,PENUP)
      DO 20 I=1,27
      Y=I
   20 CALL PLOTSYMB(0.,Y,.20,13,90.,PSDOWN)
C GO BACK TO (-1,4)
      CALL PLOTSYMB(-1.,4.,.25,YAXIS,90.,NYAXIS)
   30 READ(5,40)ACE,(AT(I),I=1,11)
   40 FORMAT(A5,2F5.0,9F5.2)
      IF(EOF(5))GO TO 80
      IF(ACE.EQ.5H     ) GO TO 60
      SHOT(1)=ACE
      ITIM=AT(1)
      Z=27.-AT(2)*.001*2.
      TS=AT(6)
      DIST=AT(7)+TS
      X=DIST/2.
      CALL PLOTSYMB(X,1.,.10,SHOT,90.,5)
C TIME=T(I)=1 SEC/INCH,DIST=2SEC/INCH,AND X AND Y IN INCHES
      II=1
      DO 100 I=1,4
      R(I)=AT(I+7)
      IF(R(I).EQ.0) GO TO 30
  100 II=I
      GO TO 30
   60 DO 70 I=1,11
      IF(AT(I).EQ.0.) GO TO 70
      Y=AT(I)+TS
      IF(Y.GT.29.) GO TO 70
      CALL PLOTSYMB(X,Y,.10,3,0.,PSUP)
   70 CONTINUE
      CALL PLOTSYMB(X,Z,.1,13,90.,PSUP)
      GO TO 30
   80 XN=NX+4
      CALL PLOT(XN,30.,PLOTEND)
      END
```

```
      PROGRAM REDPLOT2
      DIMENSION XAXIS(5),YAXIS(5),SHOT(1),AT(11),R(4)
      DIMENSION DEP(100),XD(100)
      INTEGER PLOTEND,PSUP,PSDOWN,PENUP,PENDOWN
      PLOTEND=-3 $ PSUP=-1 $ PSDOWN=-2
      PENUP=3 $ PENDOWN=2 $ DEPTH=0. $ ND=0
      WRITE(61,3)
    3 FORMAT(* GIVE REDUCING VELOCITY, F5.2*)
      READ(60,4)REDVEL
    4 FORMAT(F5.2)
      XAXIS(1)=8HDISTANCE
      XAXIS(2)=8H 1 SEC P
      XAXIS(3)=8HER INCH
      YAXIS(1)=8HTIME .5
      YAXIS(2)=8HSEC PER
      YAXIS(3)=8HINCH
      YAXIS(4)=8HT - X /
      READ(5,8) XAXIS(4),XAXIS(5)
    8 FORMAT(A8,A8)
      READ(5,9)TDTS,V1
    9 FORMAT(15X,F5.2,5X,F5.3)
      NX=TDTS/1.+4.
      IF(NX.LT.13)NX=13
      NXAXIS=40
      NYAXIS=40
      ENCODE(8,101,YAXIS(5))REDVEL
  101 FORMAT(F5.2,3X)
      CALL PLOTINT(-6.,6.,10)
      CALL PLOT(29.,0.,PLOTEND)
      CALL ROTATEXY
      DO 10 I=1,NX
      X=I
   10 CALL PLOTSYMB(X,0.,.20,13,0.,PSDOWN)
C GO BACK TO (4,-1)
      CALL PLOTSYMB(4.,-1.,.25,XAXIS,0.,NXAXIS)
      CALL PLOT(0.,0.,PENUP)
      DO 20 I=1,27
      Y=I
   20 CALL PLOTSYMB(0.,Y,.20,13,90.,PSDOWN)
C GO BACK TO (-1,4)
      CALL PLOTSYMB(-1.,4.,.25,YAXIS,90.,NYAXIS)
   30 READ(5,40)ACE,(AT(I),I=1,11)
   40 FORMAT(A5,2F5.0,9F5.2)
      IF(EOF(5))GO TO 80
      IF(ACE.EQ.5H     ) GO TO 60
      SHOT(1)=ACE
      ITIM=AT(1)
      ND=ND+1
      DEP(ND)=27.-AT(2)*.001*2.
      TS=AT(6)
      DIST=AT(7)+TS
      REDUCE=DIST*V1/REDVEL
      X=DIST/1.
      XD(ND)=X
      IF(X.GT.37.) GO TO 55
      CALL PLOTSYMB(X,1.,.10,SHOT,90.,5)
C TIME=T(I)*.5 SEC/INCH,DIST=2 SEC/INCH,AND X AND Y IN INCHES
   55 II=1
      DO 100 I=1,4
      R(I)=AT(I+7)
      IF(R(I).EQ.0) GO TO 30
  100 II=I
      GO TO 30
   60 DO 70 I=1,11
      IF(AT(I).EQ.0.) GO TO 30
      Y=AT(I)+TS
      Y=(Y-REDUCE)*2.+5.
      IF(Y.GT.27.) GO TO 70
      IF (X.GT.37.) GO TO 70
      CALL PLOTSYMB(X,Y,.10,3,0.,PSUP)
   70 CONTINUE
      GO TO 30
   80 DO 90 I=1,ND
      X=XD(I)
      DEPTH=DEP(I)
   90 CALL PLOTSYMB(X,DEPTH,.1,13,90.,PSUP)
      XN=NX+4
      CALL PLOT(XN,30.,PLOTEND)
      END
```

```
      PROGRAM MULTLAY
      DIMENSION H(20),V(20),VA(20),VB(20),ALPH(20),BETA(20), Q(20),
     1  A(20),B(20),TAI(20),TBI(20),HA(20),HB(20),DA(20),DB(20),P(20)
      DIMENSION TITLE(8)
C IF TBI INTERCEPT TIMES ARE NOT READ IN, INSERT A BLANK
C CARD WHERE THEY ARE CALLED FOR IN THE DATA DECK.  THEY
C WILL THEN BE COMPUTED BY FORMULA AFTER STEP 421.  IF THEY
C ARE READ IN, THEY WILL BE CHECKED FOR CONSISTENCY WITHIN 10 PC
 402  WRITE (61,401)

 401   FORMAT (*0*)
C N=NUMBER OF LAYERS OR TRAVEL TIME SEGMENTS, X=END-TO-END
C SPREAD LENGTH
      READ (5,405)N,X,(TITLE(I),I=1,6)
      IF(EOF(5)) CALL EXIT
 405  FORMAT (I4,F8.0,6A8)
      IF (N) 640,640,407
 407  READ (5,410)(VA(I),I=1,N)
 410  FORMAT (9F8.0)
      READ (5,410) (VB(I),I = 1,N)
      TAI(1)= .0
      READ (5,410) (TAI(I),I=2,N)
      TBI(1)= .0
      READ (5,410) (TBI(I),I=2,N)
      WRITE (61,415)X,(TITLE(I),I=1,6)
 415  FORMAT (* *,*REVERSAL DISTANCE = * ,F10.3,3X,6A8,//)
      WRITE (61,420)
 420  FORMAT(* INPUT DATA*//* LAYER     APPARENT       APPARENT*,
     1*      INTERCEPT  INTERCEPT*/*          VELOCITIES A  VELO*,
     2*CITIES B   TIMES A     TIMES B*)
      DO 425 I=2,N
      TBB = TAI(I) + X*(1./VA(I) - 1./VB(I))
      IF (TBI(I)) 422,422,423
 422  TBI(I) = TBB
      GO TO 425
 423  TAEND = TAI(I) + X/VA(I)
      TBEND = TBI(I) + X/VB(I)
      ERROR = ABSF(TAEND/TBEND - 1.)
      IF (ERROR - .10) 425,424,424
 424  WRITE (61,1424) I
1424 FORMAT(*0APPARENT VELOCITY AND TIME INTERCEPT DATA ARE*,
     1* INCONSISTENT AT LAYER */* NUMBER *,I2,*  END-TO-END *,
     2*TRAVEL TIMES DIFFER BY MORE THAN 10 PERCENT.*/)
      GO TO 425
 425  CONTINUE
      WRITE (61,1425) (I,VA(I),VB(I),TAI(I),TBI(I),I=1,N)
1425 FORMAT(* *,I4,F13.3,F14.3,F12.3,F10.3)
      V(1) = (VA(1) + VB(1))*.5
      DO 570 M = 2,N
      K = 1
      ALPH(1) = ASINF(V(1)/VB(M))
      BETA(1) = ASINF(V(1)/VA(M))
      IF (M-2) 500,500,510
 500  A(1) = (ALPH(1) + BETA(1))*.5
      W(2) = (ALPH(1) - BETA(1))*.5
      V(2) = V(1)/SINF(A(1))
      GO TO 550
 510  A(1) = ALPH(1) - W(2)
      B(1) = BETA(1) + W(2)
 520  K = K+1
      VV = V(K)/V(K-1)
      P(K) = ASINF(VV*SINF(A(K-1)))
```

```
      Q(K) = ASINF(VV*SINF(B(K-1)))
      IF (K+1-M) 530,540,540
530   A(K) = P(K) - W(K+1) + W(K)
      B(K) = Q(K) + W(K+1) - W(K)
      ALPH(K) = A(K) + W(K+1)
      BETA(K) = B(K) - W(K+1)
      GO TO 520
540   A(K) = (P(K) + Q(K))*.5
      B(K) = A(K)
      W(K+1) = W(K) + (P(K) - Q(K))*.5
      ALPH(K) = A(K) + W(K+1)
      BETA(K) = B(K) - W(K+1)
      V(K+1) = V(K)/SINF(A(K))
550   KK = K-1
      HHA=0.
      HHB = 0.
      IF(K.EQ.1)GO TO 561
      DO 560 I = 1,KK
      HH = COSF(ALPH(I)) + COSF(BETA(I))
      HH = HH/V(I)
      HHA = HHA + HH*HA(I)
560   HHB = HHB + HH*HB(I)
561   R = V(K)/(COSF(ALPH(K)) + COSF(BETA(K)))
      HA(K) = R*(TAI(K+1) - HHA)
      HB(K) = R*(TBI(K+1) - HHB)
      DA(1) = HA(1)
      DB(1) = HB(1)
      DA(K) = DA(K-1) + HA(K)
      DB(K) = DB(K-1) + HB(K)
570   CONTINUE
      RTOD=180./3.1415926
      DO 580 J = 2,N
580   W(J) = W(J)*RTOD
      WRITE (61,620)
620   FORMAT(≠0COMPUTED STRUCTURE≠//≠  LAYER   VELOCITY   ≠,
     1≠THICKNESS A    THICKNESS B    DIP    DEPTH A  DEPTH B≠)
      I = 1
      WRITE (61,625) I, V(I), HA(I), HB(I),DA(I), DB(I)
625   FORMAT(≠ ≠,I4,F12.3,F11.3,F14.3,9X,F8.3,F9.3)
      NN = N-1
      WRITE (61,630)(I, V(I), HA(I), HB(I), W (I),DA(I),DB(I),
     1 I=2,NN)
630   FORMAT(≠ ≠,I4,F12.3,F11.3,F14.3,F9.3,F8.3,F9.3)
      WRITE (61,635)N, V(N), W (N)
635   FORMAT(≠ ≠,I4,F12.3,23X,F11.3)
      GO TO 402
640   CONTINUE
      END
```

INPUT FORMAT FOR PROGRAM MULTLAY

N	X	TITLE(I)		
VA(1)	VA(2)	. . . . . .	VA(N)	
VB(1)	VB(2)	. . . . . .	VB(N)	
TAI(1)	TAI(2)	. . . . . .	TAI(N)	
TBI(1)	TBI(2)	. . . . . .	TBI(N)	

N : Number of layers (equal to number of velocities).
X : End to end profile length.
TITLE(I) : Line identification.
I=1,...,N : *Layer number.*
VA(I) : Apparent velocities from the A-end of the profile.
VB(I) : Apparent velocities from the B-end of the profile.
TAI(I) : Intercept times for layers 2 through N at A-end of the profile.
TBI(I) : Intercept times for layers 2 through N at B-end of the profile.

All *distances* in meters or kilometers.
All velocities in meters per seconds or kilometers per seconds.
All times in seconds.
With single-ended line : VB(I) = VA(I) and TBI(I) = TAI(I) .

OUTPUT FORMAT FOR PROGRAM MULTLAY

```
REVERSAL DISTANCE =      X            TITLE(I)


INPUT DATA

LAYER      APPARENT           APPARENT         INTERCEPT      INTERCEPT
           VELOCITIES  A      VELOCITIES  B    TIMES  A       TIMES  B
  1          VA(1)              VB(1)            TAI(1)         TBI(1)
  2          VA(2)              VB(2)            TAI(2)         TBI(2)
  ..         ....               ....             ....           ....
  N          VA(N)              VB(N)            TAI(N)         TBI(N)
COMPUTED  STRUCTURE

LAYER    VELOCITY   THICKNESS  A   THICKNESS  B    DIP      DEPTH  A     DEPTH  B
  1        V(1)       HA(1)          HB(1)                   DA(1)        DB(1)
  2        V(2)       HA(2)          HB(2)         W(2)      DA(2)        DB(2)
  ..       ....       ....           ....          ....      ....         ....
  N-1      V(N-1)     HA(N-1)        HB(N-1)       W(N-1)    DA(N-1)      DB(N-1)
  N        V(N)                                    W(N)
```

X : End to end spread length.
TITLE(I) : Line identification.
I=1,...,N : Layer number.
VA(I) : Apparent velocities from the A-end of the profile.
VB(I) : Apparent velocities from the B-end of the profile.
TAI(I) : Intercept times for layers 2 through N at A-end of the profile.
TBI(I) : Intercept times for layers 2 through N at B-end of the profile.
V(I) : True layer velocities.
HA(I) : Layer thicknesses at A-end.
HB(I) : Layer thicknesses at B-end.
W(I) : Layer dips in degrees.
DA(I) : Depths from surface to bottom of layers at A-end.
DB(I) : Depths from surface to bottom of layers at B-end.

All times in seconds.
All distances in meters or kilometers.
All velocities in meters per seconds or kilometers per seconds.

IV

INTERCEPT TIMES AND APPARENT VELOCITIES (INPUT OF MULTLAY) AND COMPUTED STRUCTURES (OUTPUT OF MULTLAY) FOR ALL LINES

```
            4 21.62  MGL1
            1.44     2.14     2.77     5.02
            1.44     2.14     2.77     5.02
            0.044    0.080    0.680
            0.044    0.080    0.680

REVERSAL DISTANCE =      21.620    MGL1S
```

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1.440	1.440	0	0
2	2.140	2.140	.044	.044
3	2.770	2.770	.080	.080
4	5.020	5.020	.680	.680

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1.440	.043	.043		.043	.043
2	2.140	.049	.049	0	.092	.092
3	2.770	.966	.966	0	1.058	1.058
4	5.020		0			

```
            4 12.77  MGL2
            1.44     2.14     2.99     5.26
            1.44     2.14     2.99     5.26
            0.031    0.230    0.760
            0.031    0.230    0.760

REVERSAL DISTANCE =      12.770    MGL2S
```

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1.440	1.440	0	0
2	2.140	2.140	.031	.031
3	2.990	2.990	.230	.230
4	5.260	5.260	.760	.760

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1.440	.030	.030		.030	.030
2	2.140	.296	.296	0	.326	.326
3	2.990	.848	.848	0	1.175	1.175
4	5.260		0			

```
        6 26.61  BI 6 TO 1  M1267
     1.44     2.25     2.46     3.01     3.727   5.387
     1.44     2.25     2.46     3.01     3.716   5.259
     0.10     0.15     0.20     0.45     1.40
     0.10     0.15     0.20     0.43     1.28
```

REVERSAL DISTANCE =   26.610   BI 6 TO 1 M1267S

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1.440	1.440	0	0
2	2.250	2.250	.100	.100
3	2.460	2.460	.150	.150
4	3.010	3.010	.200	.200
5	3.727	3.716	.450	.430
6	5.387	5.259	1.400	1.280

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1.440	.094	.094		.094	.094
2	2.250	.124	.124	0	.217	.217
3	2.460	.027	.027	0	.244	.244
4	3.010	.578	.527	0	.823	.771
5	3.721	2.183	1.944	.116	3.006	2.715
6	5.322			.624		

```
        6 29.39  BI 4 TO 3  M345
     1.44     2.29     2.56     2.99     3.898   4.904
     1.44     2.29     2.56     2.99     3.867   4.674
     0.10     0.16     0.20     0.56     1.375
     0.10     0.16     0.20     0.50     1.080
```

REVERSAL DISTANCE =   29.390   BI 4 TO 3 M345S

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1.440	1.440	0	0
2	2.290	2.290	.100	.100
3	2.560	2.560	.160	.160
4	2.990	2.990	.200	.200
5	3.898	3.867	.560	.500
6	4.904	4.674	1.375	1.080

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1.440	.093	.093		.093	.093
2	2.290	.137	.137	0	.230	.230
3	2.560	.025	.025	0	.255	.255
4	2.990	.771	.630	0	1.026	.885
5	3.892	2.419	1.683	.276	3.445	2.568
6	4.784			1.707		

```
5  10858.ARC WEST 76 BEAUFORT W8A9A
1440.     1600.     2230.     3020.     4680.
1440.     1600.     2230.     3020.     4680.
 .010      .215      .575     1.255
 .010      .215      .575     1.255
```

REVERSAL DISTANCE = 10858.000 ARC WEST 76 BEAUFORT W8A9AS

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1440.000	1440.000	0	0
2	1600.000	1600.000	.010	.010
3	2230.000	2230.000	.215	.215
4	3020.000	3020.000	.575	.575
5	4680.000	4680.000	1.255	1.255

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1440.000	16.518	16.518		16.518	16.518
2	1600.000	226.806	226.806	0	243.324	243.324
3	2230.000	519.818	519.818	0	763.142	763.142
4	3020.000	1100.723	1100.723	0	1863.865	1863.865
5	4680.000			0		

```
7  23846.ARC WEST 76 BEAUFORT W889B
1440.     1600.     2230.     2830.     4240.     5630.     7070.
1440.     1600.     2230.     2830.     4240.     5630.     7070.
 .010      .215      .470     1.050     1.440     1.925
 .010      .215      .470     1.050     1.440     1.925
```

REVERSAL DISTANCE = 23846.000 ARC WEST 76 BEAUFORT W889BS

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1440.000	1440.000	0	0
2	1600.000	1600.000	.010	.010
3	2230.000	2230.000	.215	.215
4	2830.000	2830.000	.470	.470
5	4240.000	4240.000	1.050	1.050
6	5630.000	5630.000	1.440	1.440
7	7070.000	7070.000	1.925	1.925

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1440.000	16.518	16.518		16.518	16.518
2	1600.000	226.806	226.806	0	243.324	243.324
3	2230.000	391.899	391.899	0	635.223	635.223
4	2830.000	887.279	887.279	0	1522.501	1522.501
5	4240.000	906.128	906.128	0	2428.629	2428.629
6	5630.000	1750.786	1750.786	0	4179.415	4179.415
7	7070.000			0		

7 28.07 LINE 10-11 12-13 WITH 6.0 AND 7.0 LAYERS M1012

1.440	1.650	2.509	3.044	4.056	6.000	6.906
1.440	1.650	2.509	3.090	3.804	6.000	7.129
0.008	0.440	0.675	1.130	1.760	1.805	
0.008	0.440	0.820	1.360	1.760	1.830	

REVERSAL DISTANCE = 28.070 LINE 10-11 12-13 WITH 6.0 AND 7.0 LAYERS M1012S

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1.440	1.440	0	0
2	1.650	1.650	.008	.008
3	2.509	2.509	.440	.440
4	3.044	3.090	.675	.820
5	4.056	3.804	1.130	1.360
6	6.000	6.000	1.760	1.760
7	6.906	7.129	1.805	1.830

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1.440	.012	.012		.012	.012
2	1.650	.467	.467	0	.479	.479
3	2.509	.400	.716	0	.879	1.195
4	3.067	.877	.966	-0.611	1.756	2.161
5	3.921	1.085	.362	2.615	2.841	2.523
6	5.994	-0.186	.063	-0.927	2.655	2.586
7	7.006			-2.886		

6 29736.ARC WEST 76 BEAUFORT M1617

1440.	1600.	1820.	2440.	3620.	6080.
1440.	1600.	1820.	2440.	3620.	6080.
.010	.100	.380	1.025	1.745	
.010	.100	.380	1.025	1.745	

REVERSAL DISTANCE = 29736.000 ARC WEST 76 BEAUFORT M1617S

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1440.000	1440.000	0	0
2	1600.000	1600.000	.010	.010
3	1820.000	1820.000	.100	.100
4	2440.000	2440.000	.380	.380
5	3620.000	3620.000	1.025	1.025
6	6080.000	6080.000	1.745	1.745

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1440.000	16.518	16.518		16.518	16.518
2	1600.000	144.306	144.306	0	160.824	160.824
3	1820.000	307.807	307.807	0	468.631	468.631
4	2440.000	907.945	907.945	0	1376.575	1376.575
5	3620.000	1226.193	1226.193	0	2602.768	2602.768
6	6080.000			0		

```
6  26698.ARC WEST 76 BEAUFORT W1819
1440.    1600.    1840.    2320.    3310.    5660.
1440.    1600.    1840.    2320.    3310.    5660.
 .010     .125     .465    1.205    2.310
 .010     .125     .465    1.205    2.310
```

REVERSAL DISTANCE = 26698.000   ARC WEST 76 BEAUFORT W1819S

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1440.000	1440.000	0	0
2	1600.000	1600.000	.010	.010
3	1840.000	1840.000	.125	.125
4	2320.000	2320.000	.465	.465
5	3310.000	3310.000	1.205	1.205
6	5660.000	5660.000	2.310	2.310

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1440.000	16.518	16.518		16.518	16.518
2	1600.000	179.367	179.367	0	195.885	195.885
3	1840.000	429.958	429.958	0	625.843	625.843
4	2320.000	975.136	975.136	0	1600.979	1600.979
5	3310.000	1762.815	1762.815	0	3363.794	3363.794
6	5660.000			0		

```
6  22651.ARC WEST 76 BEAUFORT W2021
1440.    1600.    1890.    2350.    3390.    5680.
1440.    1600.    1890.    2350.    3390.    5680.
 .010     .125     .490    1.105    2.075
 .010     .125     .490    1.105    2.075
```

REVERSAL DISTANCE = 22651.000   ARC WEST 76 BEAUFORT W2021S

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1440.000	1440.000	0	0
2	1600.000	1600.000	.010	.010
3	1890.000	1890.000	.125	.125
4	2350.000	2350.000	.490	.490
5	3390.000	3390.000	1.105	1.105
6	5680.000	5680.000	2.075	2.075

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1440.000	16.518	16.518		16.518	16.518
2	1600.000	165.535	165.535	0	182.053	182.053
3	1890.000	509.354	509.354	0	691.407	691.407
4	2350.000	740.727	740.727	0	1432.134	1432.134
5	3390.000	1630.983	1630.983	0	3063.117	3063.117
6	5680.000			0		

```
6  45770.ARC WEST 76 BEAUFORT M22A24B REVERSE
1440.    1600.    1832.    2348.    2932.    5781.
1440.    1600.    1826.    2315.    2880.    6034.
 .010     .175     .450     .810    1.715
 .010     .100     .170     .525    2.050
```

REVERSAL DISTANCE = 41000.000   ARC WEST 76 BEAUFORT M24A22BS REVERSE

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1440.000	1440.000	0	0
2	1600.000	1600.000	.010	.010
3	1937.000	1945.000	.120	.215
4	3395.000	3398.000	1.165	1.175
5	5687.000	5750.000	2.210	2.290

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1440.000	16.518	16.518		16.518	16.518
2	1600.000	147.839	282.087	0	164.357	298.605
3	1940.983	1160.407	997.175	-0.172	1324.764	1295.781
4	3396.490	1869.649	2032.408	.035	3194.413	3328.189
5	5718.294			-0.185		

```
5  41000.ARC WEST 76 BEAUFORT M24A22B REVERSE
1440.    1600.    1937.    3395.    5687.
1440.    1600.    1945.    3398.    5750.
 .010     .120    1.165    2.210
 .010     .215    1.175    2.290
```

REVERSAL DISTANCE = 45770.000   ARC WEST 76 BEAUFORT M22A24BS REVERSE

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1440.000	1440.000	0	0
2	1600.000	1600.000	.010	.010
3	1832.000	1826.000	.175	.100
4	2348.000	2315.000	.450	.170
5	2932.000	2880.000	.810	.525
6	5781.000	6034.000	1.715	2.050

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1440.000	16.518	16.518		16.518	16.518
2	1600.000	265.613	141.769	0	282.131	158.287
3	1828.987	280.927	34.027	.170	563.058	192.315
4	2331.318	535.554	641.024	.455	1098.612	833.338
5	2905.706	1100.086	2197.800	.325	2198.698	3031.138
6	5903.385			-1.034		

REVERSAL DISTANCE = [illegible]

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

REVERSAL DISTANCE = [illegible]

INPUT DATA

LAYER	APPARENT VELOCITIES A	APPARENT VELOCITIES B	INTERCEPT TIMES A	INTERCEPT TIMES B
1	1440.000	[illegible]	0.	0.
2	1600.000	[illegible]	[illegible]	[illegible]
3	2100.000	2100.000	[illegible]	[illegible]
4	3430.000	3430.000	[illegible]	[illegible]
5	4430.000	[illegible]	[illegible]	[illegible]
6	6000.000	6000.000	[illegible]	[illegible]

COMPUTED STRUCTURE

LAYER	VELOCITY	THICKNESS A	THICKNESS B	DIP	DEPTH A	DEPTH B
1	1440.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	1600.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	2100.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	3430.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	4430.000	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
6	[illegible]					

V

PROGRAM TO COMPUTE THE OFFSET DISTANCES OF THE RAYS (WAREFRA) AND INPUT AND OUTPUT DATA FOR PROCESSED LINES

```
      PROGRAM WAREFRA
C THIS PROGRAM COMPUTES PLANE DIPPING LAYER MODEL
C PARAMETERS.SECTIONS OF LAYERS ALONG WHICH RAY IS REFRACTED
C AND THE CRITICAL DISTANCE.  THE INPUT DATA REQUIRES
C KNOWN OR APPARENT LAYER VELOCITIES (VA) AND EITHER
C INTERCEPT TIME FROM REFRACTED ARRIVAL OR LAYER THICKNESS
C VERTICALLY UNDER THE ORIGIN. LAYER DIP IS ASSUMED ZERO
C IF LEFT BLANK.  IF LAYER THICKNESS IS GIVEN, GIVEN
C VELOCITY IS TAKEN TO BE THE TRUE LAYER VELOCITY.
      DIMENSION V(10),HDR(10),W(10),VA(10),TIA(10),HA(10)
      DIMENSION  B (10), ALPHA (10), BETA (10), HB (10), A (10)
      DIMENSION XA(10),XB(10),YA(10),YB(10),XC(10),P(10)
      DIMENSION  Q (10)
      RTOD = 180. / 3.14159265
      DTOR = 1. / RTOD
C  READ HDR CARD
   10 READ (5, 100) N, V(1), X, HDR
      IF(EOF(5)) CALL EXIT
C N IS NUMBER OF LAYERS, V(1) IS VELOCITY OF FIRST LAYER,
C X IS LENGTH OF LINE, HDR IS IDENTIFIER MAX LENGTH OF 8
  100 FORMAT (I5,F5.3,F5.2,10A8)
      IF (EOF (1)) CALL EXIT
      IF (N .LT. 10) GO TO 15
      WRITE (61, 110) N
  110 FORMAT (*-N LARGER THAN DIMENSIONS  N =*,I5)
      CALL EXIT
   15 K = 2
      VA (1) = V (1)
      W (1) = 0.0
C  READ SUCCEEDING CARDS
C IF HA(I)IS NOT GIVEN, COMPUTE MODEL FROM TIA INTERCEPT
      READ (5, 101) VA (2), TIA (2), W (2), HA (1)
  101 FORMAT (4F5.3)
      W (2) = W (2) * DTOR
      BETA (1) = ASINF (V (1) / VA (2))
      A (1) = B (1) = BETA (1) + W (2)
      ALPHA (1) = A (1) + W (2)
      V (2) = V (1) / SIN (A (1))
      IF(HA(1).NE.0.0) V(2)=VA(2)
C  FIND OUT IF THICKNESS GIVEN. IF NOT, CALCULATE VELOCITY AND
C ANGLES.
      IF (HA (1) .NE. 0.0) GO TO 30
      IF (TIA (2) .NE. 0.0) GO TO 25
   22 WRITE (61, 111)
  111 FORMAT (*-HA AND TIA .EQ. 0.0*)
      CALL EXIT
C COMPUTE DEPTHS TO LAYERS
   25 HA(1)=(TIA(2)*V(1))/(COS(ALPHA(1))+COS(BETA(1)))
   30 HB (1) = HA (1) - X * TANF(W (2))
C COMPUTE CRITICAL DISTANCES AND END POINTS IN LAYER
C WHERE RAY TRAVELS AS REFRACTED WAVE
      XA (1) = HA (1) * TANF(ALPHA (1))
     1          / (1.0 + TANF(W (2)) * TANF(ALPHA (1)))
      YA (1) = HA (1) - XA (1) * TANF(W (2))
      XC(1)=(HA(1)-XA(1)*TANF(W(2)))*TANF(B(1))+XA(1)
      XB (1) = HB (1) * TANF(BETA (1))
     1          / (1.0 - TANF(BETA (1)) * TANF(W (2)))
      YB (1) = HB (1) + XB (1) * TANF(W (2))
      XB (1) = X - XB (1)
   40 K = K + 1
C DO LAYERS 3 THROUGH N
      READ (5, 101) VA (K), TIA (K), W (K), HA (K-1)
C COMPUTE ANGLES
      W (K) = W (K) * DTOR
      BETA (1) = ASINF (V (1) / VA (K))
      B (1) = BETA (1) + W (2)
      I = 1
      KM1 = K - 1
   50 I = I + 1
      Q (I) = ASINF (V (I) / V (I-1) * SIN (B (I-1)))
      BETA (I) = Q (I) - W (I)
      B (I) = BETA (I) + W (I+1)
      IF (I .LT. KM1) GO TO 50
      A (K-1) = B (K-1)
      ALPHA (K-1) = A (K-1) + W (K)
      V (K) = V (K-1) / SIN (A (K-1))
      IF(HA(K-1).NE.0.0) V(K)=VA(K)
      P (K-1) = A (K-1) - W (K-1) + W (K)
      I = K - 1
   70 I = I - 1
      A (I) = ASINF (V (I) / V (I+1) * SIN (P (I+1)))
      ALPHA (I) = A (I) + W (I+1)
      P (I) = A (I) - W (I) + W (I+1)
      IF (I .NE. 1) GO TO 70
      KM2 = K - 2
      TEMP1 = TEMP2 = TEMP3 = 0.0
      DO 80 I = 1, KM2
      TEMP1 = TEMP1 + HA (I) / V (I) * (COS (ALPHA (I))
```

```
1           + COS (BETA (I)))
      TEMP2 = TEMP2 + HA (I)
      TEMP3 = TEMP3 + HB (I)
   80 CONTINUE
      IF (HA (K-1) .NE. 0.0) GO TO 85
C FIND OUT IF THICKNESS GIVEN. IF NOT COMPUTE VELOCITY AND
C MORE ANGLES
      IF (TIA (K) .EQ. 0.0) GO TO 22
C COMPUTE DEPTH TO LAYER
      HA (K-1) = (TIA (K) - TEMP1) * V (K-1)
     1           / (COS (ALPHA (K-1)) + COS (BETA (K-1)))
C COMPUTE DISTANCES IN LAYER WHERE WAVE IS REFRACTED
   85 TEMP2 = TEMP2 + HA (K-1)
      HB (K-1) = TEMP2 - TEMP3 - X * TANF(W (K))
      TEMP 3 = TEMP 3 + HB (K-1)
      TEMPXA = HA (1) * TANF(ALPHA (1))
     1           / (1.0 + TANF(W (2)) * TANF(ALPHA (1)))
      TEMPXB = HB (1) * TANF(BETA (1))
     1          / (1.0 - TANF(W (2)) * TANF(BETA (1)))
      DO 115 I = 2, KM1
      TEMPXA = TEMPXA + (HA (I) * TANF(ALPHA (I)) + TEMPXA
     1          * TANF(ALPHA (I)) * (TANF(W (I)) - TANF(W (I+1))))
     2          / (1.0 + TANF(ALPHA (I)) * TANF(W (I+1)))
      TEMPXB = TEMPXB + (HB (I) * TANF(BETA (I))  - TEMPXB
     1          * TANF(BETA (I)) * (TANF(W (I)) - TANF(W (I+1))))
     2          / (1.0 - TANF(BETA (I)) * TANF(W (I+1)))
  115 CONTINUE
      XA (K-1) = TEMPXA
      XB (K-1) = X - TEMPXB
      YA (K-1) = TEMP2 - XA (K-1) * TANF(W (K))
      YB (K-1) = TEMP3 + TEMPXB * TANF(W (K))
      I = K
      DELTAXC = TEMPXA
  120 I = I - 1
      DELTAXC = DELTAXC + (HA (I) * TANF(BETA (I)) + DELTAXC
     1          * TANF(BETA (I)) * (TANF(W(I)) - TANF(W (I+1))))
     2          / (1.0 - TANF(W (I)) * TANF(BETA (I)))
      IF (I .GT. 2) GO TO 120
      XC (K-1) = DELTAXC + (HA (1) - DELTAXC * TANF(W (2)))
     1          * TANF(BETA (1))
C GO BACK FOR ANOTHER LAYER
      IF (K .LT. N) GO TO 40
C CONVERT ANGLES TO DEGREES
      DO 130 I = 1,N
      W (I) = W (I) * RTOD
  130 CONTINUE
C PRINT OUT RESULTS
      WRITE (61, 102) HDR, N, X
  102 FORMAT (*0*,10A8,/,* N = *,I2,*    SPREAD = *,F6.1)
      WRITE (61, 103)
  103 FORMAT (*0 N  APPARENT   DIP   LAYER THICKNESS*,/,
     1       *     VELOCITY               AT ORIGIN*)
      NM1 = N - 1
      DO 140 I = 1, NM1
      WRITE (61, 104) I, VA (I), W (I), HA (I)
  104 FORMAT (I3,F9.3,F8.3,6X,F6.3)
  140 CONTINUE
      WRITE (61, 104) N, VA (N), W (N)
      WRITE (61, 105)
  105 FORMAT (*0 N  DEPTH A  THICK A  VELOCITY  THICK B  *
     1   *DEPTH B*)
      SHA = 0.0
      SHB = 0.0
      DO 150 I = 1, NM1
      SHA = SHA + HA (I)
      SHB = SHB + HB (I)
      WRITE (61, 106) I, SHA, HA (I), V (I), HB (I), SHB
  106 FORMAT (I3,F8.3,F9.3,F10.3,F10.3,F9.3)
  150 CONTINUE
      WRITE (61, 107) N, V (N)
  107 FORMAT (I3,18X,F8.2)
      WRITE (61, 108) X
  108 FORMAT (*0LAYER  RAY TO LAYER  CRITICAL DIST  RAY FROM *,
     1*LAYER*,/,*              X       Y                        X*,
     2*          Y*,/,*        0.00       0.00                   *,
     3 F7.2,*     0.00*)
      DO 160 I = 1, NM1
      IP1 = I + 1
      WRITE (61, 109) I, XA (I), YA (I), XC (I), XB (I), YB (I)
  109 FORMAT (I3,F9.3,F8.3,F11.3,F14.3,F8.3)
  160 CONTINUE
      GO TO 10
      END
```

INPUT FORMAT FOR PROGRAM WAREFRA

N	V1	X	TITLE(I)	
VA(1)	TAI(1)			
VA(2)	TAI(2)	W(2)	HA(1)	
....	....	....	....	
VA(N)	TAI(N)	W(N)	HA(N-1)	

N : Number of layers (equal to number of velocities).
V1 : Water velocity.
X : End to end spread length.
TITLE(I) : Line identification.
I=1,....,N : Layer number.
VA(I) : Apparent velocities at A-end or true velocities.
TAI(I) : Intercept times at A-end.
W(I) : Layer dips in degrees.
HA(I) : Layer thicknesses at A-end.

All times in seconds.
All distances in kilometers.
All velocities in kilometers per seconds.
The program needs intercept times or layer thicknesses.
The layer dip is assumed zero if left blank.
If the layer thickness is given , the given velocity is taken to be the true layer velocity.

OUTPUT FORMAT FOR PROGRAM WAREFRA

TITLE(I)

N =	N	SPREAD =	X

N	APPARENT VELOCITY	DIP		LAYER THICKNESS AT ORIGIN
1	VA(1)	W(1)		HA(1)
2	VA(2)	W(2)		HA(2)
...	....	....		....
N-1	VA(N-1)	W(N-1)		HA(N-1)
N	VA(N)	W(N)		

N	DEPTH A	THICK A	VELOCITY	THICK B	DEPTH B
1	SHA(1)	HA(1)	V(1)	HB(1)	SHB(1)
2	SHA(2)	HA(2)	V(2)	HB(2)	SHB(2)
...	....	....	....	....	....
N-1	SHA(N-1)	HA(N-1)	V(N-1)	HB(N-1)	SHB(N-1)
N			V(N)		

LAYER	RAY TO LAYER X	Y	CRITICAL DIST	RAY FROM LAYER X	Y
	0.00	0.00		X	0.00
1	XA(1)	YA(1)	XC(1)	XB(1)	YB(1)
2	XA(2)	YA(2)	XC(2)	XB(2)	YB(2)
...	....	....	....	....	....
N-1	XA(N-1)	YA(N-1)	XC(N-1)	XB(N-1)	YB(N-1)

TITLE(I)	: Line identification.
N	: Number of layers including the water layer.
X	: End to end spread length.
I=1,.....,N	: Layer number.
VA(I)	: Apparent velocities at the A-end of the profile or true velocities.
W(I)	: Layer dips in degrees.
HA(I)	: Layer thicknesses at A-end.
HB(I)	: Layer thicknesses at B-end.
V(I)	: True velocities.
SHA(I)	: Layer depths at A-end.
SHB(I)	: Layer depths at B-end.
XA(I)	: Offset distances from A-end.
XB(I)	: Offset distances from B-end.
XC(I)	: Critical distances.
YA(I)	: Layer depths at the offset distances at A-end.
YB(I)	: Layer depths at the offset distances at B-end.

All distances in kilometers.

All velocities in kilometers per seconds.

```
                41.44 21.62 WGL1
            2.136 .044
            2.769 .080
            5.017 .690

 WGL1S
N =  4    SPREAD =    21.6
 N  APPARENT   DIP    LAYER THICKNESS
    VELOCITY             AT ORIGIN
 1     1.440       0          .043
 2     2.136       0          .049
 3     2.769       0          .966
 4     5.017       0
 N  DEPTH A   THICK A   VELOCITY   THICK B   DEPTH B
 1    .043      .043      1.440      .043      .043
 2    .092      .049      2.136      .049      .092
 3   1.057      .966      2.769      .966     1.057
 4                        5.02
LAYER  RAY TO LAYER   CRITICAL DIST   RAY FROM LAYER
         X       Y                       X        Y
       0.00    0.00                    21.62    0.00
 1     .039    .043        .078        21.581   .043
 2     .085    .092        .171        21.535   .092
 3     .675   1.057       1.350        20.945  1.057
```

```
                41.44 12.77 WGL2
            2.136 .031
            2.994 .230
            5.255 .760

 WGL2S
N =  4    SPREAD =    12.8
 N  APPARENT   DIP    LAYER THICKNESS
    VELOCITY             AT ORIGIN
 1     1.440       0          .030
 2     2.136       0          .294
 3     2.994       0          .852
 4     5.255       0
 N  DEPTH A   THICK A   VELOCITY   THICK B   DEPTH B
 1    .030      .030      1.440      .030      .030
 2    .325      .294      2.136      .294      .325
 3   1.177      .852      2.994      .852     1.177
 4                        5.26
LAYER  RAY TO LAYER   CRITICAL DIST   RAY FROM LAYER
         X       Y                       X        Y
       0.00    0.00                    12.77    0.00
 1     .028    .030        .055        12.742   .030
 2     .316    .325        .633        12.454   .325
 3     .730   1.177       1.461        12.040  1.177
```

```
61.44 26.61 BI 6 TO 1  W1267
2.249 .100
2.463 .150
3.013 .200
3.721       .116 .578
5.322       .6242.183
```

BI 6 TO 1 W1267S

N = 6 SPREAD = 26.6

N	APPARENT VELOCITY	DIP	LAYER THICKNESS AT ORIGIN
1	1.440	0	.094
2	2.249	0	.122
3	2.463	0	.028
4	3.013	0	.578
5	3.721	.116	2.183
6	5.322	.624	

N	DEPTH A	THICK A	VELOCITY	THICK B	DEPTH B
1	.094	.094	1.440	.094	.094
2	.216	.122	2.249	.122	.216
3	.244	.028	2.463	.028	.244
4	.822	.578	3.013	.524	.769
5	3.005	2.183	3.721	1.947	2.716
6			5.32		

LAYER	RAY TO LAYER X	Y	CRITICAL DIST	RAY FROM LAYER X	Y
	0.00	0.00		26.61	0.00
1	.078	.094	.156	26.532	.094
2	.342	.216	.683	26.268	.216
3	.228	.244	.457	26.382	.244
4	.960	.820	1.912	25.727	.770
5	2.716	2.976	5.323	24.219	2.742

```
61.44 29.39 BI 4 TO 3  W345
2.289 .100
2.556 .168
2.993 .280
3.882       .276 .771
4.794      1.7072.419
```

BI 4 TO 3 W345S

N = 6 SPREAD = 29.4

N	APPARENT VELOCITY	DIP	LAYER THICKNESS AT ORIGIN
1	1.440	0	.093
2	2.289	0	.138
3	2.556	0	.023
4	2.993	0	.771
5	3.882	.276	2.419
6	4.794	1.707	

N	DEPTH A	THICK A	VELOCITY	THICK B	DEPTH B
1	.093	.093	1.440	.093	.093
2	.231	.138	2.289	.138	.231
3	.254	.023	2.556	.023	.254
4	1.025	.771	2.993	.629	.883
5	3.444	2.419	3.882	1.685	2.568
6			4.78		

LAYER	RAY TO LAYER X	Y	CRITICAL DIST	RAY FROM LAYER X	Y
	0.00	0.00		29.39	0.00
1	.075	.093	.150	29.315	.093
2	.341	.231	.682	29.049	.231
3	.253	.254	.506	29.137	.254
4	1.105	1.020	2.191	28.464	.888
5	4.436	3.312	8.394	26.281	2.661

```
              51.44 10.86  W8A9A
          1.600 .010        .016
          2.230 .215        .227
          3.020 .575        .520
          4.6801.255       1.101

W8A9AS
N =  5    SPREAD =   10.9
 N  APPARENT    DIP   LAYER THICKNESS
    VELOCITY             AT ORIGIN
 1     1.440      0         .016
 2     1.600      0         .227
 3     2.230      0         .520
 4     3.020      0        1.101
 5     4.680      0
 N  DEPTH A   THICK A  VELOCITY  THICK B  DEPTH B
 1    .016      .016     1.440     .016     .016
 2    .243      .227     1.600     .227     .243
 3    .763      .520     2.230     .520     .763
 4   1.864     1.101     3.020    1.101    1.864
 5                       4.68
LAYER  RAY TO LAYER  CRITICAL DIST  RAY FROM LAYER
          X       Y                      X       Y
        0.00    0.00                   10.86    0.00
 1      .033    .016       .066       10.827    .016
 2      .247    .243       .495       10.613    .243
 3      .720    .763      1.440       10.140    .763
 4     1.300   1.864      2.599        9.560   1.864
```

```
              71.44 23.85  W8898
          1.600 .010        .016
          2.230 .215        .227
          2.830 .470        .392
          4.2401.050        .887
          5.6301.440        .906
          7.0701.925       1.751

W8898S
N =  7    SPREAD =   23.9
 N  APPARENT    DIP   LAYER THICKNESS
    VELOCITY             AT ORIGIN
 1     1.440      0         .016
 2     1.600      0         .227
 3     2.230      0         .392
 4     2.830      0         .887
 5     4.240      0         .906
 6     5.630      0        1.751
 7     7.070      0
 N  DEPTH A   THICK A  VELOCITY  THICK B  DEPTH B
 1    .016      .016     1.440     .016     .016
 2    .243      .227     1.600     .227     .243
 3    .635      .392     2.230     .392     .635
 4   1.522      .887     2.830     .887    1.522
 5   2.428      .906     4.240     .906    2.428
 6   4.179     1.751     5.630    1.751    4.179
 7                       7.07
LAYER  RAY TO LAYER  CRITICAL DIST  RAY FROM LAYER
          X       Y                      X       Y
        0.00    0.00                   23.85    0.00
 1      .033    .016       .066       23.817    .016
 2      .247    .243       .495       23.603    .243
 3      .667    .635      1.333       23.183    .635
 4     1.136   1.522      2.271       22.714   1.522
 5     1.793   2.428      3.587       22.057   2.428
 6     3.558   4.179      7.116       20.292   4.179
```

```
                  71.44 30.6   W1011
              1.650 .030       .044
              2.320 .365       .372
              3.030 .670       .429
              4.1001.140       .821
              5.6101.545       .787
              6.9101.805       .782

W1011S
N =  7    SPREAD =    30.6
 N  APPARENT    DIP    LAYER THICKNESS
    VELOCITY               AT ORIGIN
 1     1.440       0          .044
 2     1.650       0          .372
 3     2.320       0          .429
 4     3.030       0          .821
 5     4.100       0          .787
 6     5.610       0          .782
 7     6.910       0
 N  DEPTH A   THICK A   VELOCITY   THICK B   DEPTH B
 1    .044      .044      1.440      .044      .044
 2    .416      .372      1.650      .372      .416
 3    .845      .429      2.320      .429      .845
 4   1.666      .821      3.030      .821     1.666
 5   2.453      .787      4.100      .787     2.453
 6   3.235      .782      5.610      .782     3.235
 7                        6.91
LAYER  RAY TO LAYER   CRITICAL DIST   RAY FROM LAYER
          X       Y                       X        Y
        0.00     0.00                    30.60     0.00
 1      .079     .044        .157        30.521    .044
 2      .411     .416        .822        30.189    .416
 3      .776     .845       1.552        29.824    .845
 4     1.375    1.666       2.750        29.225   1.666
 5     1.691    2.453       3.381        28.909   2.453
 6     2.322    3.235       4.644        28.279   3.235
```

```
                  71.44 32.4   W1213
              1.650 .030       .044
              2.540 .450       .433
              3.460 .960       .827
              4.0001.290       .865
              5.9801.755       .519
              7.1401.840       .042

W1213S
N =  7    SPREAD =    32.4
 N  APPARENT    DIP    LAYER THICKNESS
    VELOCITY               AT ORIGIN
 1     1.440       0          .044
 2     1.650       0          .433
 3     2.540       0          .827
 4     3.460       0          .865
 5     4.000       0          .519
 6     5.980       0          .042
 7     7.140       0
 N  DEPTH A   THICK A   VELOCITY   THICK B   DEPTH B
 1    .044      .044      1.440      .044      .044
 2    .477      .433      1.650      .433      .477
 3   1.304      .827      2.540      .827     1.304
 4   2.169      .865      3.460      .865     2.169
 5   2.688      .519      4.000      .519     2.688
 6   2.730      .042      5.980      .042     2.730
 7                        7.14
LAYER  RAY TO LAYER   CRITICAL DIST   RAY FROM LAYER
          X       Y                       X        Y
        0.00     0.00                    32.40     0.00
 1      .079     .044        .157        32.321    .044
 2      .400     .477        .801        32.000    .477
 3     1.149    1.304       2.298        31.291   1.304
 4     2.384    2.169       4.768        30.016   2.169
 5     1.604    2.688       3.208        30.796   2.688
 6     1.321    2.730       2.643        31.079   2.730
```

```
              61.44 29.74  W1617
          1.600 .010        .016
          1.820 .100        .144
          2.440 .380        .308
          3.6201.025        .908
          6.0801.745       1.226

W1617S
N =  6    SPREAD =    29.7
 N  APPARENT    DIP   LAYER THICKNESS
    VELOCITY             AT ORIGIN
 1     1.440       0         .016
 2     1.600       0         .144
 3     1.820       0         .308
 4     2.440       0         .908
 5     3.620       0        1.226
 6     6.080       0
 N   DEPTH A   THICK A   VELOCITY   THICK B   DEPTH B
 1     .016      .016      1.440      .016      .016
 2     .160      .144      1.600      .144      .160
 3     .468      .308      1.820      .308      .468
 4    1.376      .908      2.440      .908     1.376
 5    2.602     1.225      3.620     1.226     2.602
 6                         6.08
LAYER  RAY TO LAYER   CRITICAL DIST   RAY FROM LAYER
          X        Y                       X          Y
        0.00     0.00                    29.74      0.00
 1      .033     .016        .066       29.707      .016
 2      .286     .160        .573       29.454      .160
 3      .482     .468        .963       29.258      .468
 4     1.086    1.376       2.171       28.654     1.376
 5     1.446    2.602       2.892       28.294     2.602
```

```
              61.44 26.70  W1819
          1.600 .010        .016
          1.840 .125        .179
          2.320 .465        .430
          3.3101.205        .975
          5.6602.310       1.763

W1819S
N =  6    SPREAD =    26.7
 N  APPARENT    DIP   LAYER THICKNESS
    VELOCITY             AT ORIGIN
 1     1.440       0         .016
 2     1.600       0         .179
 3     1.840       0         .430
 4     2.320       0         .975
 5     3.310       0        1.763
 6     5.660       0
 N   DEPTH A   THICK A   VELOCITY   THICK B   DEPTH B
 1     .016      .016      1.440      .016      .016
 2     .195      .179      1.600      .179      .195
 3     .625      .430      1.840      .430      .625
 4    1.600      .975      2.320      .975     1.600
 5    3.363     1.763      3.310     1.763     3.363
 6                         5.66
LAYER  RAY TO LAYER   CRITICAL DIST   RAY FROM LAYER
          X        Y                       X          Y
        0.00     0.00                    26.70      0.00
 1      .033     .016        .066       26.667      .016
 2      .335     .195        .671       26.365      .195
 3      .743     .625       1.486       25.957      .625
 4     1.352    1.600       2.704       25.348     1.600
 5     1.914    3.363       3.828       24.786     3.363
```

61.44 22.65 W2021

1.600	.010	.016
1.890	.125	.165
2.350	.490	.509
3.390	1.105	.741
5.680	2.075	1.631

W2021S

N = 6 SPREAD = 22.6

N	APPARENT VELOCITY	DIP	LAYER THICKNESS AT ORIGIN
1	1.440	0	.016
2	1.600	0	.165
3	1.890	0	.509
4	2.350	0	.741
5	3.390	0	1.631
6	5.680	0	

N	DEPTH A	THICK A	VELOCITY	THICK B	DEPTH B
1	.016	.016	1.440	.016	.016
2	.181	.165	1.600	.165	.181
3	.690	.509	1.890	.509	.690
4	1.431	.741	2.350	.741	1.431
5	3.062	1.631	3.390	1.631	3.062
6			5.68		

LAYER	RAY TO LAYER X	RAY TO LAYER Y	CRITICAL DIST	RAY FROM LAYER X	RAY FROM LAYER Y
	0.00	0.00		22.65	0.00
1	.033	.016	.066	22.617	.016
2	.281	.181	.562	22.369	.181
3	.855	.690	1.709	21.795	.690
4	1.150	1.431	2.301	21.580	1.431
5	1.782	3.062	3.564	20.868	3.062

61.44 45.77 W22A248

1.600 .010		.016
1.829	+0.17	.266
2.331	+0.45	.281
2.906	+0.32	.535
5.903	-1.03	1.100

W22A248S

N = 6 SPREAD = 45.8

N	APPARENT VELOCITY	DIP	LAYER THICKNESS AT ORIGIN
1	1.440	0	.016
2	1.600	0	.266
3	1.829	.170	.281
4	2.331	.450	.535
5	2.906	.320	1.100
6	5.903	-1.030	

N	DEPTH A	THICK A	VELOCITY	THICK B	DEPTH B
1	.016	.016	1.440	.016	.016
2	.282	.266	1.600	.130	.146
3	.563	.281	1.829	.057	.204
4	1.098	.535	2.331	.639	.842
5	2.198	1.100	2.906	2.179	3.021
6			5.90		

LAYER	RAY TO LAYER X	RAY TO LAYER Y	CRITICAL DIST	RAY FROM LAYER X	RAY FROM LAYER Y
	0.00	0.00		45.77	0.00
1	.033	.016	.066	45.737	.016
2	.505	.281	1.003	45.513	.147
3	.633	.558	1.247	45.560	.205
4	1.162	1.092	2.303	44.752	.848
5	.967	2.215	2.014	44.281	2.993

```
            51.44 41.00  W24A229
        1.600 .010       .015
        1.941      -0.17 .148
        3.396      +0.031.160
        5.718      -0.181.870

W24A229S
N =  5   SPREAD =   41.0
 N  APPARENT   DIP   LAYER THICKNESS
    VELOCITY            AT ORIGIN
 1     1.440       0       .016
 2     1.600       0       .148
 3     1.941  -0.170      1.160
 4     3.396    .030      1.870
 5     5.718  -0.180
 N  DEPTH A  THICK A  VELOCITY  THICK B  DEPTH B
 1    .016     .016     1.440     .016     .016
 2    .164     .148     1.600     .270     .286
 3   1.324    1.160     1.941    1.017    1.303
 4   3.194    1.870     3.396    2.020    3.323
 5                      5.72
LAYER  RAY TO LAYER  CRITICAL DIST  RAY FROM LAYER
          X        Y                     X        Y
        0.00     0.00                  41.00     0.00
 1      .033     .016       .066       40.967     .016
 2      .231     .165       .466       40.591     .294
 3      .894    1.324      1.786       40.141    1.303
 4     1.825    3.200      3.672       39.067    3.317
```

```
            51.44 32.14  W26A27A
        1.600 .010       .016
        2.130 .270       .307
        2.990 .750       .616
        4.1481.340      1.013
        5.2801.735       .866

W26A27AS
N =  6   SPREAD =   32.1
 N  APPARENT   DIP   LAYER THICKNESS
    VELOCITY            AT ORIGIN
 1     1.440       0       .016
 2     1.600       0       .307
 3     2.130       0       .616
 4     2.990       0      1.013
 5     4.140       0       .866
 6     5.280       0
 N  DEPTH A  THICK A  VELOCITY  THICK B  DEPTH B
 1    .015     .016     1.440     .016     .016
 2    .323     .307     1.600     .307     .323
 3    .939     .616     2.130     .616     .939
 4   1.952    1.013     2.990    1.013    1.952
 5   2.818     .866     4.140     .866    2.818
 6                      5.28
LAYER  RAY TO LAYER  CRITICAL DIST  RAY FROM LAYER
          X        Y                     X        Y
        0.00     0.00                  32.14     0.00
 1      .033     .016       .066       32.107     .016
 2      .364     .323       .728       31.776     .323
 3      .829     .939      1.657       31.311     .939
 4     1.562    1.952      3.124       30.578    1.952
 5     2.164    2.818      4.328       29.976    2.818
```

```
              61.44 34.44  W268279
           1.600 .010       .016
           2.100 .360       .424
           3.4301.060       .757
           4.4301.505       .959
           6.8802.830      3.243

W268279S
N =   6    SPREAD =    34.4
 N  APPARENT    DIP    LAYER THICKNESS
    VELOCITY               AT ORIGIN
 1     1.440        0         .016
 2     1.600        0         .424
 3     2.100        0         .757
 4     3.430        0         .959
 5     4.430        0        3.243
 6     6.880        0
 N   DEPTH A   THICK A   VELOCITY   THICK B   DEPTH B
 1     .016      .016      1.440       .016      .016
 2     .440      .424      1.600       .424      .440
 3    1.197      .757      2.100       .757     1.197
 4    2.156      .959      3.430       .959     2.156
 5    5.399     3.243      4.430      3.243     5.399
 6                         6.88
LAYER   RAY TO LAYER   CRITICAL DIST   RAY FROM LAYER
           X        Y                       X         Y
         0.00     0.00                    34.44      0.00
 1       .033     .016         .066       34.407     .016
 2       .514     .440        1.028       33.926     .440
 3       .817    1.197        1.634       33.623    1.197
 4      1.751    2.156        3.591       32.689    2.156
 5      3.628    5.399        7.256       30.812    5.399
```

VI

PROGRAM TO COMPUTE CORRECTIONS TO HELICOPTER-RECORDED DATA (BEAUHELI) AND INPUT AND OUTPUT DATA FOR PROCESSED LINES

```
      PROGRAM BEAUHELI
      PI=3.1415926536
      DTR=PI/180.
      RTD=180./PI
      READ(5,100)AID1,AID2
  100 FORMAT(2A8)
      READ(5,105)IYRMO1,IDA1,IHR1,MIN1,DIF1,IYRMO2,
     1 IDA2,IHR2,MIN2,DIF2
      IF(IYRMO1.NE.IYRMO2)GO TO 5
  105 FORMAT(2(I4,I2,X,2I2,X,F6.2))
      GO TO 10
    5 WRITE(61,110)IYRMO1,IYRMO2
  110 FORMAT(≠ CLOCK CORR YM ≠,I4,≠ DIFFERS FROM YM ≠,I4)
      CALL EXIT
   10 TIM1=IDA1*86200+IHR1*3600+MIN1*60
      TIM2=IDA2*86200+IHR2*3600+MIN2*60
      READ(5,115)ISBYM,ISBD,ISBH,ISBM,ISBN,ISBP
  115 FORMAT(I4,I2,X,2I2,X,2I2)
      SBTIM=ISBD*86200+ISBH*3600+ISBM*60
      READ(5,120)CLK,SLK,WATVELK,DBB,DBE,TDIST,DR,DBR
  120 FORMAT(8F8.3)
      WRITE(6,125)AID1,AID2
  125 FORMAT(≠ ≠,2A8)
      WRITE(6,130)IYRMO1,IDA1,IHR1,MIN1,DIF1
  130 FORMAT(≠ PRESHOT  TIME CHECK ≠,I4,I2,X,2I2,≠ DELTA T= ≠,
     1 F7.3)
      WRITE(6,135)IYRMO2,IDA2,IHR2,MIN2,DIF2
  135 FORMAT(≠ POSTSHOT TIME CHECK ≠,I4,I2,X,2I2,
     1 ≠ DELTA T= ≠,F7.3)
      WRITE(6,140)
  140 FORMAT(≠ ALL DISTANCES IN KILOMETERS, ALL VELOCITIES ≠,
     1 ≠IN KM/SEC, ALL TIMES ARE UNIVERSAL TIME≠)
      WRITE(6,145)CLK,SLK,WATVELK
  145 FORMAT(≠ CABLE LENGTH= ≠,F8.3,≠ ACTIVE SECTION ≠,
     1≠LENGTH= ≠,F8.3,≠ WATER VELOCITY= ≠,F8.3)
      WRITE(6,147)DBB,DBE,TDIST,DR,DBR
  147 FORMAT(≠ START DEPTH= ≠,
     1 F8.3,≠ END DEPTH= ≠,F8.3,≠ LINE LENGTH= ≠,F8.3,
     2 ≠ RECEIVER DEPTH= ≠,F8.3,≠ DEPTH AT RECEIVER= ≠,F8.3)
      READ(4,150)NYRMO1,NDA1,NHR1,NMN1,NLAT1,ALATM1,NLON1,ALONM1
  150 FORMAT(I4,I2,X,2I2,X,I3,X,F5.2,X,I4,X,F5.2)
      ANTIM1=NDA1*86200+NHR1*3600+NMN1*60
      ALAT1=(NLAT1+ALATM1/60.)*DTR
      ALON1=(NLON1-ALONM1/60.)*DTR
      KIT=0
   15 READ(4,150)NYRMO2,NDA2,NHR2,NMN2,NLAT2,ALATM2,NLON2,ALONM2
      ANTIM2=NDA2*86200+NHR2*3600+NMN2*60
      ALAT2=(NLAT2+ALATM2/60.)*DTR
      ALON2=(NLON2-ALONM2/60.)*DTR
      IF(KIT.EQ.1) GO TO 28
      IF(SBTIM.GE.ANTIM1.AND.SBTIM.LT.ANTIM2) GO TO 20
      ANTIM1=ANTIM2
      ALAT1=ALAT2
      ALON1=ALON2
      GO TO 15
   20 FACTOR=(SBTIM-ANTIM1)/(ANTIM2-ANTIM1)
      SBLON=(ALON2-ALON1)*FACTOR+ALON1
      SBLAT=(ALAT2-ALAT1)*FACTOR+ALAT1
      SBLOP=SBLON*RTD
      SBLAP=SBLAT*RTD
      WRITE(6,155)ISBN,ISBP,ISBYM,ISBD,ISBH,ISBM,SBLAP,SBLOP
  155 FORMAT(≠ SONOBUOY ≠,I2,≠ AT POSITION ≠,I2,
```

```
  1 * TIME *,I4,I2,X,2I2,* LAT *,F7.3,* LONG *,F8.3)
    WRITE(6,160)
160 FORMAT(*0YRMODA SHOT  LATITUDE LONGITUDE  SIZE  BURN *,
  1 * DEPTH SDIST CADIS TRAVT TTRAW SURF BOTC *,
  2 *CLKC SCOR SHOTTIME   SPVEL SPVELC*)
    KIT=1
 25 READ(5,165)ISHOT,SIZE,BURN,DEPK,DIST,KSYM,KSDA,
  1 KSHR,KSMN,SSEC,KHHR,KHMN,HSEC,SPVEL
    IF(EOF(5)) CALL EXIT
165 FORMAT(I5,4F5.2,X,I4,I2,X,2I2,X,F5.2,X,2I2,X,F5.2,X,F6.5)
    SHORTIM=KSDA*86200+KSHR*3600+KSMN*60+SSEC-BURN
 28 IF(SHORTIM.GE.ANTIM1.AND.SHORTIM.LT.ANTIM2)GO TO 30
    ANTIM1=ANTIM2
    ALAT1=ALAT2
    ALON1=ALON2
    GO TO 15
 30 FACTOR=(SHORTIM-ANTIM1)/(ANTIM2-ANTIM1)
    SHLON=(ALON2-ALON1)*FACTOR+ALON1
    SHLAT=(ALAT2-ALAT1)*FACTOR+ALAT1
    ARG=SINF(ALAT1)*SINF(ALAT2)+
  1 COSF(ALAT1)*COSF(ALAT2)*COSF(ALON2-ALON1)
    PDIST=6359.059*ACOSF(ARG)
    ARG=SINF(SBLAT)*SINF(SHLAT)+
  1 COSF(SBLAT)*COSF(SHLAT)*COSF(SHLON-SBLON)
    SDIST=6359.059*ACOSF(ARG)
    SPVELC=PDIST/(ANTIM2-ANTIM1)
    SHOTX=SPVEL*BURN-SLK-CLK
    SHOTZ=(-40.55+1.513*BURN)/1000.
    IF(SHOTZ.GT.DEPK)SHOTZ=DEPK
    SHCOR=SQRT(SHOTX*SHOTX+SHOTZ*SHOTZ)/WATVELK
    STIMC=SSEC-SHCOR
    SHTIMC=SHORTIM+BURN-SHCOR
    CKCOR=DIF1+(DIF2-DIF1)*(SHORTIM-TIM1)/(TIM2-TIM1)
    ARTIMH=KSDA**6200+KHHR*3600+KHMN*60+HSEC+CKCOR
    TTRAW=ARTIMH-SHTIMC
    TDEP=DBB+(DBE-DBB)*DIST/TDIST
    S1=SQRT(1.-WATVELK*WATVELK/5./5.)
    SURFCOR=(DR+SHOTZ)*S1/WATVELK
    BOTCOR=(TDEP-DEPK+DBE-DBR)*S1/WATVELK
    TTCOR=TTRAW+SURFCOR+BOTCOR
    SHLON=SHLON*RTD
    LLON=SHLON
    ALONM=-(SHLON-LLON)*60.
    SHLAT=SHLAT*RTD
    LLAT=SHLAT
    ALATM=(SHLAT-LLAT)*60.
    WRITE(6,170)KSYM,KSDA,ISHOT,LLAT,ALATM,LLON,ALONM,
  1 SIZE,BURN,DEPK,SDIST,DIST,TTCOR,TTRAW,SURFCOR,BOTCOR,
  2 CKCOR,SHCOR,KSHR,KSMN,STIMC,SPVEL,SPVELC
    WRITE(7,175)KSYM,KSDA,ISHOT,LLAT,ALATM,LLON,ALCNM,
  1 SIZE,BURN,DEPK,SDIST,DIST,TTCCR,TTRAW,SURFCOR,BOTCOR,
  2 CKCOR,SHCOR,KSHR,KSMN,STIMC,SPVEL,SPVELC
170 FORMAT(* *,I4,I2,X,I4,X,I3,X,F5.2,X,I4,X,F5.2,X,F5.1,F6.1,
  1 F6.3,4F6.2,4F5.2,X,2I2,F6.2,2F7.5)
175 FORMAT(I4,I2,X,I4,X,I3,X,F5.2,X,I4,X,F5.2,X,F5.1,F6.1,
  1 F6.3,4F6.2,4F5.2,X,2I2,F6.2,2F7.5)
    GO TO 25
    END
```

DATA INPUT FORMAT FOR PROGRAM BEAUHELI

AID1	AID2

IYRMO1	IDA1	IHR1	MIN1	DIF1	IYRMO2	IDA2	IHR2	MIN2	DIF2

ISBYM	ISBD	ISBH	ISBM	ISBN	ISBP

CLK	SLK	WATVELK	DBB	DBE	TDIST	DR	DBR

ISHOT	SIZE	BURN	DEPK	DIST	KSYM	KSDA	KSHR	KSMN	SSEC	KHHR	KHMN	HSEC	SPVEL

AID1,AID2 : Line Identification.

IYRMO1,IDA1,IHR1,MIN1: Year,month,day,hour and minute of the preshot time check.

IYRMO2,IDA2,IHR2,MIN2: Year,month,day,hour and minute of the postshot time check.

DIF1 : Clock correction (Time difference between the ship's master clock and the helicopter's clock) of preshot time check.

DIF2 : Clock correction of postshot time check.

ISBYM,ISBD,ISBH,ISBM : Year,month,day,hour and minute of the sonobuoy's drop.

ISBN : Sonobuoy number.

ISBP : Sonobuoy position.

CLK : Cable length in kilometers.

SLK : Streamer length (active section only) in kilometers.

WATVELK : Water velocity.

DBB : Depth to the bottom at the beginning of the line.

DBE : Depth to the bottom at the end of the line.

TDIST : End to end spread length (Total distance).

DR : Depth of the receiver (Hydrophone depth).

DBR : Depth to bottom at the receiver (Offset depth based on some average basement velocity).

ISHOT : Shot number.

SIZE : Size of the shot in pounds.

BURN : Burn time.

DEPK : Depth to the bottom at the shot point in kilometers (Offset depth).

DIST : Estimated drift distance between shot and sonobuoy computed manually.

KSYM,KSDA,KSHR,KSMN,SSEC : Year,month,day,hour,minute and second of the shot.

KHHR,KHMN,HSEC : Hour,minute and second of the helicopter ground arrival.

SPVEL : Ship velocity.

NAVIGATION INPUT FORMAT FOR PROGRAM BEAUHELI

TITLE(I)

NYRMO1	NDA1	NHR1	NMN1	NLAT1	ALATM1	NLON1	ALONM1	
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	
. . .	. . .	. . .	. . .	. . .	. . .	. . .	. . .	
NYRMOK	NDAK	NHRK	NMNK	NLATK	ALATMK	NLONK	ALONMK	

TITLE(I)	: *Line identification.*
K	: Number of ship's navigation points for the profile.
I=1,.....,K	: Ship's navigation points number.
NYRMO(I), NDA(I), NHR(I), NMN(I)	: Year,month,day,hour and minute of navigation points.
NLAT(I), ALATM(I)	: Position in latitude (degrees and minutes) of the ship's navigation points.
NLON(I), ALONM(I)	: Position in longitude (degrees and minutes) of the ship's navigation points.

OUTPUT FORMAT FOR PROGRAM BEAUHELI

```
AID1        AID2
PRESHOT   TIME CHECK   IYRMO1 DA1 IHR1 MIN1  DELTA T =  DIF1
POSTSHOT  TIME CHECK   IYRMO2 DA2 HR2  MIN2  DELTA T =  DIF2
ALL DISTANCES IN KILOMETERS, ALL VELOCITIES IN KM/S, ALL TIMES
CABLE LENGTH =  CLK   ACTIVE SECTION LENGTH =  SLK   WATER V
START DEPTH =  DBB   END DEPTH =  DBE   LINE LENGTH =  TDIST
SONOBUOY ISBN AT POSITION ISBP TIME ISBYM ISBD SBH ISBM LAT SBLAP LONG
YRHODA SHOT LATITUDE LONGITUDE SIZE BURN DEPTH SDIST CADIS
KSYM KSDA ISHOT LLAT ALATM LLON ALONM SIZE BURN DEPK SDIST DIST

ARE UNIVERSAL TIME
ELOCITY =  WATVELK
RECEIVER DEPTH =  DR   DEPTH AT RECEIVER =  DBR
SBLOP
TRAVT TTRAW SURFC BOTC SLKC SCOR SHOT TIME SPVEL SPVELC
TTCOR ITRAW SURFCOR BOTCOR CKCOR SHCOR KSHR KSMN STIMC SPVEL SPVELC
```

OUTPUT FORMAT FOR PROGRAM BEAUHELI

SBLAP,SBLOP	: Sonobuoy position in latitude and longitude.
KSYM,KSDA	: Year,month and day of the shot.
LLAT,ALATM	: Shot position in latitude (degrees and minutes).
LLON,ALONM	: Shot position in longitude (degrees and minutes).
SDIST	: Corrected distance between shot and sonobuoy computed mathematically.
TTCOR	: Corrected travel time including all corrections.
TTRAW	: Travel time including shot and clock corrections but without any bottom or surface corrections.
SURFCOR	: Surface correction.
BOTCOR	: Bottom correction.
CKCOR	: Clock correction between ship and helicopter.
SHCOR	: Total corrections for shot time.
KSHR,KSMN,STIMC	: Corrected shot time in hours,minutes and seconds.
SPVEL	: Ship velocity.
SPVELC	: Corrected ship velocity.

AID1,AID2,IYRMO1,IDA1,IHR1,MIN1,IYRMO2,IDA2,IHR2,MIN2,DIF1,DIF2,ISBYM,ISBD,ISBH,ISBM,ISBN,ISBP,CLK,SLK,WATVELK,DBB,

DBE,TDIST,DR,DBR,ISHOT,SIZE,BURN,DEPK,DIST: All the same as in input file.

```
BFAU76 LINE 22A-23 HELICOPTER
760817 0350 0.010 760817 1023 0.022
760817 0500  522
0.061   0.00457 1.440   0.019   0.01   70.      0.0183  0.020
  341 120.135.0 .020 37.6 760817 0738 55.61 0739 03.07 .00474
  342 120.135.0 .020 39.0 760817 0743 49.52 0743 57.07 .00474
  343 120.190.0 .020 42.2 760817 0754 51.11 0754 59.35 .00474
  344 240.192.3 .020 44.6 760817 0802 27.99 0802 36.84 .00474
  345 240.190.3 .020 45.6 760817 0808 46.29 0808 55.34 .00474
  346 240.192.9 .020 47.1 760817 0816 51.50 0817 00.75 .00474
  347 240.188.5 .020 48.5 760817 0825 03.07 0825 12.71 .00474
  348 360.265.7 .020 50.8 760817 0836 19.83 0836 29.79 .00474
  349 480.340.0 .019 54.4 760817 0852 00.14 0852 10.24 .00474
  350 480.199.8 .019 59.3 760817 0907 28.15 0907 39.70 .00474
  351 600.192.9 .020 69.0 760817 0932 22.44 0932 35.40 .00474
```

```
BEAU76 NAV22
763817 0500  71 00.10 -152 00.20
760817 0520  70 59.10 -151 54.40
760817 0540  70 57.90 -151 47.10
760817 0600  70 56.60 -151 38.20
760817 0620  70 56.10 -151 27.70
760817 0640  70 55.30 -151 17.70
760817 0700  70 53.90 -151 08.30
760817 0720  70 53.90 -151 08.30
760817 0740  70 52.90 -151 00.40
760817 0800  70 51.80 -150 50.70
760817 0820  70 47.20 -150 50.00
760817 0850  70 45.00 -150 42.00
760817 0900  70 44.00 -150 39.00
760817 0926  70 42.50 -150 24.50
760817 0930  70 39.59 -150 12.70
```

BEAU76 HELI22
PRESHOT TIME CHECK 760817 350 DELTA T= .010
POSTSHOT TIME CHECK 760817 1023 DELTA T= .022
ALL DISTANCES IN KILOMETERS, ALL VELOCITIES IN KM/SEC, ALL TIMES ARE UNIVERSAL TIME
CABLE LENGTH= .061 ACTIVE SECTION LENGTH= .005 WATER VELOCITY= 1.440
START DEPTH= .019 END DEPTH= .019 LINE LENGTH= 70.000 RECEIVER DEPTH= .018 DEPTH AT RECEIVER= .020
SONOBUOY 5 AT POSITION 22 TIME 760817 5 0 LAT 71.002 LONG -152.003

YRMODA	SHOT	LATITUDE	LONGITUDE	SIZE	BURN	DEPTH	SDIST	CADIS	TRAVT	TTRAW	SURF	BOTC	CLKC	SCOR	SHOTTIME	SPVEL	SPVELC
760817	341	70 53.07	-151 1.71	120.0	135.0	.020	37.64	37.60	7.90	7.88	.03	-0.00	.02	.40	738 55.21	.00474	.00427
760817	342	70 52.81	-150 59.64	120.0	135.0	.020	38.99	39.00	7.99	7.97	.03	-0.00	.02	.40	743 49.12	.00474	.00518
760817	343	70 52.26	-150 54.73	120.0	190.0	.020	42.13	42.20	8.06	8.84	.03	-0.00	.02	.58	754 50.53	.00474	.00518
760817	344	70 51.84	-150 51.06	240.0	192.3	.020	44.49	44.60	9.48	9.46	.03	-0.00	.02	.59	8 2 27.40	.00474	.00518
760817	345	70 50.51	-150 50.50	240.0	190.3	.020	45.72	45.60	9.67	9.65	.03	-0.00	.02	.58	8 8 45.71	.00474	.00710
760817	346	70 48.66	-150 50.22	240.0	192.9	.020	47.33	47.10	9.88	9.86	.03	-0.00	.02	.59	816 50.91	.00474	.00710
760817	347	70 47.06	-150 49.49	240.0	188.5	.020	49.14	48.50	10.26	10.23	.03	-0.00	.02	.58	825 2.49	.00474	.00353
760817	348	70 46.33	-150 46.83	360.0	265.7	.020	51.22	50.80	10.83	10.81	.03	-0.01	.02	.83	836 19.00	.00474	.00353
760817	349	70 45.27	-150 42.98	480.0	340.0	.019	54.24	54.40	11.22	11.19	.02	-0.00	.02	1.07	852 -0.93	.00474	.00353
760817	350	70 43.76	-150 36.69	480.0	199.8	.019	58.97	59.30	12.21	12.18	.02	-0.00	.02	.61	9 7 27.54	.00474	.00595
760817	351	70 41.73	-150 21.39	600.0	192.9	.020	68.91	69.00	13.59	13.57	.03	-0.00	.02	.59	932 21.85	.00474	.01251

```
BEAU76 LINE 24A-25 HELICOPTER
760817 1023 0.022 760818 1400 0.04
760818 0306 1624
0.061    0.00457 1.440    0.017    0.017    70.        0.0183  0.016
   382 120.136.7 .01829.67 760818 0519 22.89 0519 30.14 .00402
   383 120.138.5 .01830.45 760818 0523 24.13 0523 31.56 .00402
   384 120.138.2 .01832.00 760818 0527 54.00 0528 01.61 .00402
   385 240.163.0 .01835.90 760818 0538 53.86 0539 02.04 .00402
   386 240.192.1 .01839.35 760818 0549 58.02 0550 06.57 .00402
   387 240.192.3 .01841.00 760818 0558 18.60 0558 27.65 .00402
   388 240.182.7 .01844.50 760818 0607 08.82 0607 18.37 .00402
   389 360.208.4 .01849.00 760818 0620 34.93 0620 44.99 .00402
   390 360.210.0 .01852.35 760818 0633 51.94 0634 02.29 .00402
   391 480.211.2 .01757.80 760818 0650 39.94 0650 51.29 .00402
   392 480.217.8 .01662.95 760818 0709 54.03 0710 06.24 .00402
   393 660.213.0 .01568.55 760818 0726 46.00 0726 59.25 .00402
```

```
BEAU76 NAV24
760818 0300  70 40.35 -150 00.20
760818 0320  70 41.60 -150 10.70
760818 0340  70 42.60 -150 20.20
760818 0400  70 44.20 -150 29.00
760818 0420  70 45.80 -150 39.20
760818 0440  70 47.50 -150 48.00
760818 0500  70 47.40 -150 50.00
760818 0520  70 49.00 -150 52.00
760818 0540  70 49.20 -151 05.80
760818 0600  70 50.60 -151 15.00
760818 0620  70 52.60 -151 24.50
760818 0640  70 54.00 -151 33.00
760818 0700  70 54.00 -151 44.00
760818 0720  70 55.60 -151 55.00
760818 0740  70 56.70 -152 00.00
```

```
BEAU76 HELI24
PRESHOT  TIME CHECK 760817 1023 DELTA T=     .022
POSTSHOT TIME CHECK 760818 14 0 DELTA T=     .040
ALL DISTANCES IN KILOMETERS, ALL VELOCITIES IN KM/SEC, ALL TIMES ARE UNIVERSAL TIME
CABLE LENGTH=      .061 ACTIVE SECTION LENGTH=      .005 WATER VELOCITY=    1.440
START DEPTH=      .017 END DEPTH=      .017 LINE LENGTH=   70.000 RECEIVER DEPTH=      .018 DEPTH AT RECEIVER=      .016
SONOBUOY 16 AT POSITION 24 TIME 760818  3 6 LAT  70.679 LONG -150.856
```

YRMODA	SHOT	LATITUDE	LONGITUDE	SIZE	BURN	DEPTH	SDIST	CADIS	TRAVT	TTRAW	SURF	BOTC	CLKC	SCOR	SHOTTIME	SPVEL	SPVELC
760818	382	70 48.77	-150 51.71	120.0	136.7	.018	33.04	29.67	7.72	7.70	.02	-0.00	.03	.41	519 22.48	.00482	.00267
760818	383	70 49.01	-150 52.75	120.0	138.5	.018	33.81	30.45	7.91	7.88	.02	-0.00	.03	.42	523 23.71	.00482	.00700
760818	384	70 49.06	-150 55.86	120.0	138.2	.018	35.54	32.08	8.09	8.06	.02	-0.00	.03	.42	527 53.58	.00482	.00700
760818	385	70 49.16	-151 3.16	240.0	163.0	.018	39.68	35.90	8.74	8.71	.02	-0.00	.03	.50	538 53.36	.00482	.00700
760818	386	70 49.67	-151 8.91	240.0	192.1	.018	43.27	39.35	9.21	9.18	.02	-0.00	.03	.60	549 57.42	.00482	.00513
760818	387	70 50.26	-151 12.75	240.0	192.3	.018	45.83	41.80	9.71	9.68	.02	-0.00	.03	.60	558 18.00	.00482	.00513
760818	388	70 51.01	-151 16.95	240.0	182.7	.018	48.72	44.50	10.18	10.15	.02	-0.00	.03	.57	6 7 8.25	.00482	.00571
760818	389	70 52.31	-151 23.11	360.0	208.4	.018	53.11	49.00	10.77	10.75	.02	-0.00	.03	.65	620 34.28	.00482	.00571
760818	390	70 53.33	-151 28.91	360.0	210.0	.018	57.06	52.35	11.07	11.04	.02	-0.00	.04	.66	633 51.28	.00482	.00480
760818	391	70 54.00	-151 36.93	480.0	211.2	.017	62.02	57.00	12.07	12.05	.02	.00	.04	.66	650 39.28	.00482	.00555
760818	392	70 54.50	-151 47.45	480.0	217.8	.016	68.28	62.95	12.95	12.93	.02	.00	.04	.68	7 9 53.35	.00482	.00607
760818	393	70 55.79	-151 57.09	660.0	213.0	.015	74.57	68.55	13.99	13.96	.02	.00	.04	.67	726 45.33	.00482	.00679

VII

RECORD SECTIONS AND STRUCTURAL CROSS-SECTIONS

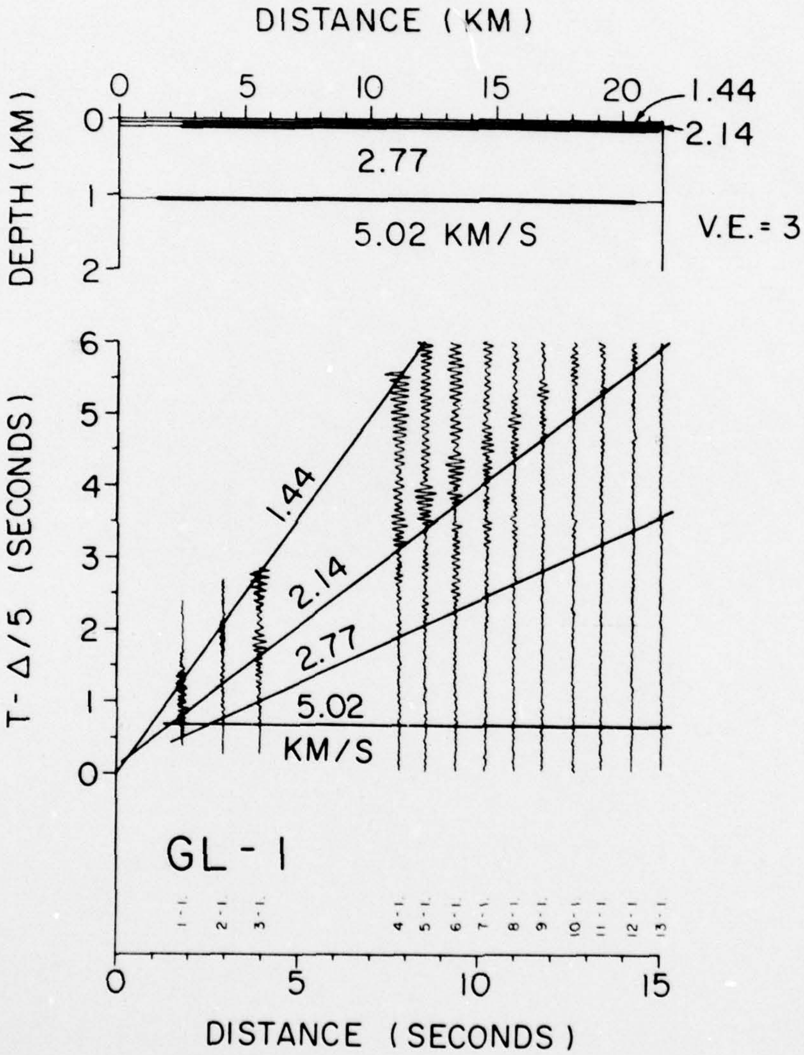

Figure 8. Line GL-1 record section and velocity-depth model interpretation. Below each seismogram is listed the shot number and the charge weight in pounds.

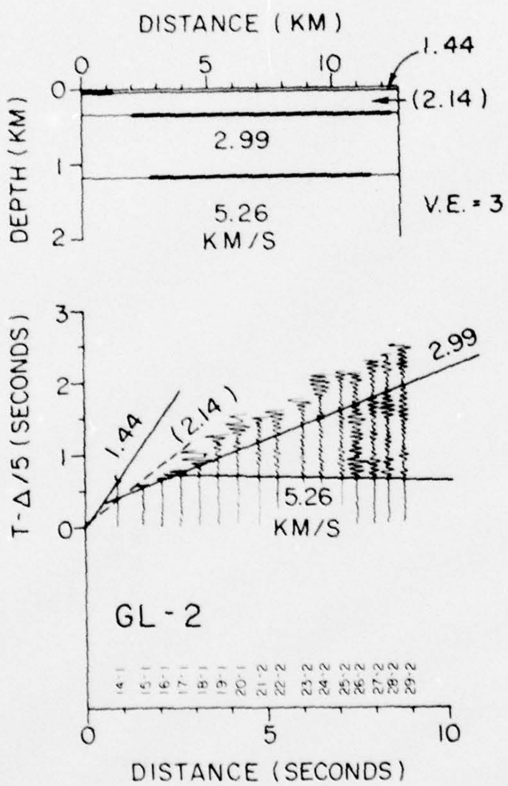

Figure 9. Line GL-2 record section and velocity-depth model interpretation.

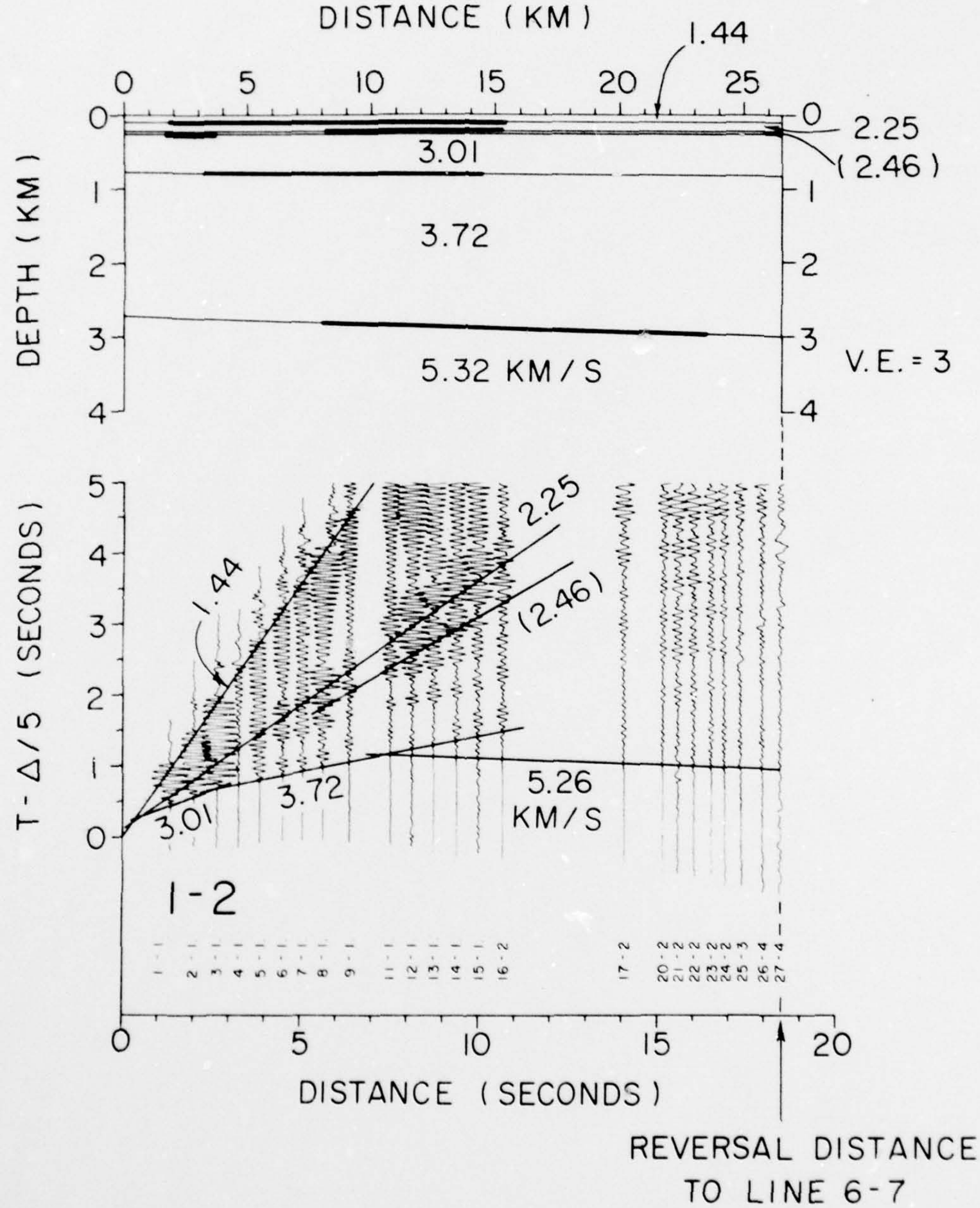

Figure 10. Line 1-2 record section and velocity-depth model interpretation.

AD-A073 403 OREGON STATE UNIV CORVALLIS SCHOOL OF OCEANOGRAPHY F/G 8/11
MARINE SEISMIC REFRACTION DATA BETWEEN WAINWRIGHT INLET AND PRU--ETC(U)
JUN 79 M BEE, S H JOHNSON, E F CHIBURIS N00014-76-C-0067

UNCLASSIFIED 79-9 NL

2 OF 2

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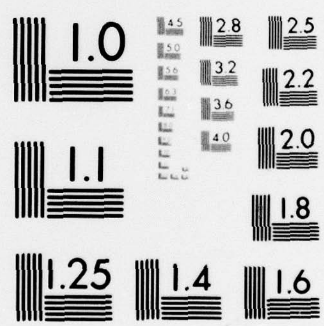


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

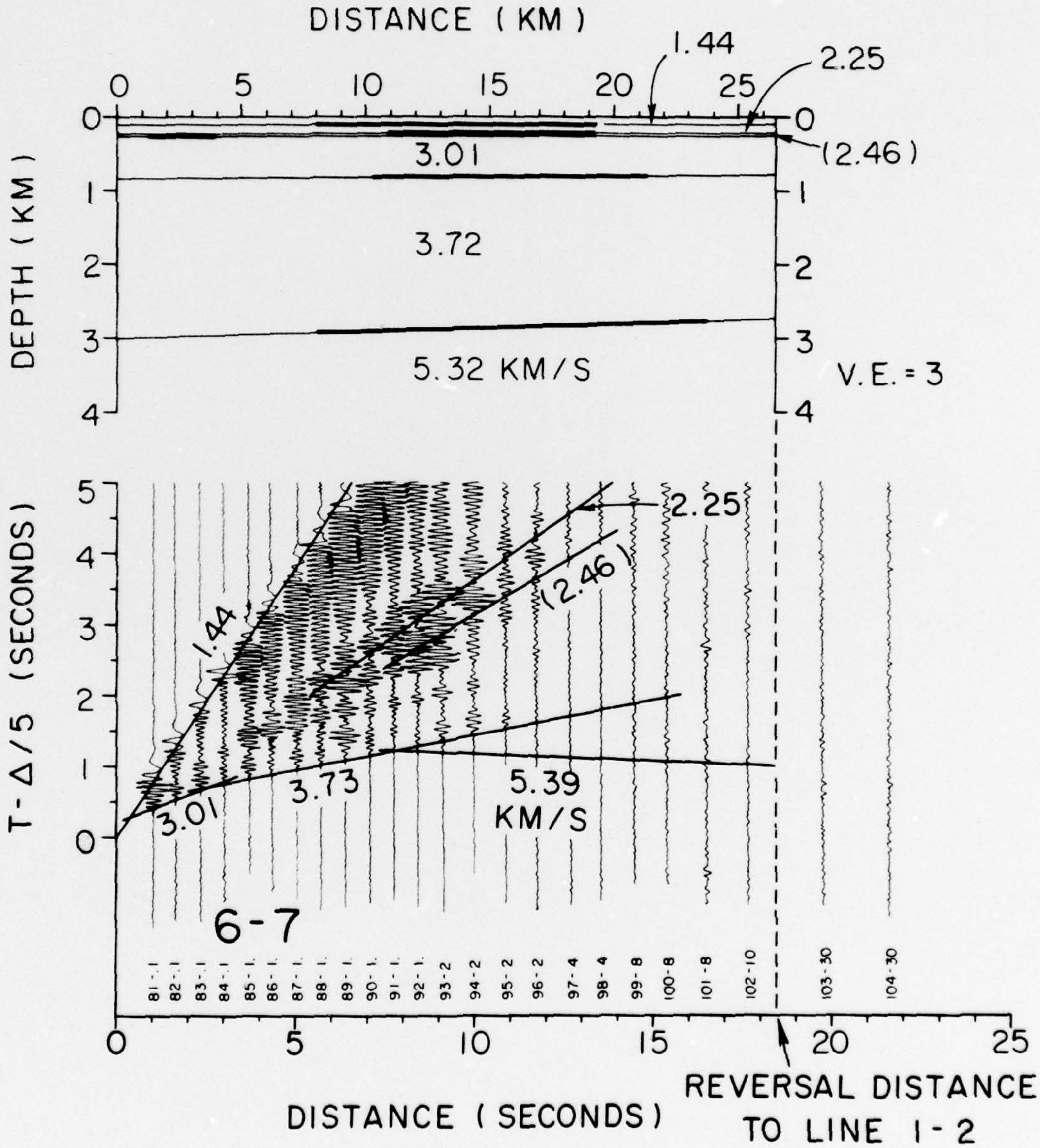


Figure 11. Line 6-7 record section and velocity-depth model interpretation.

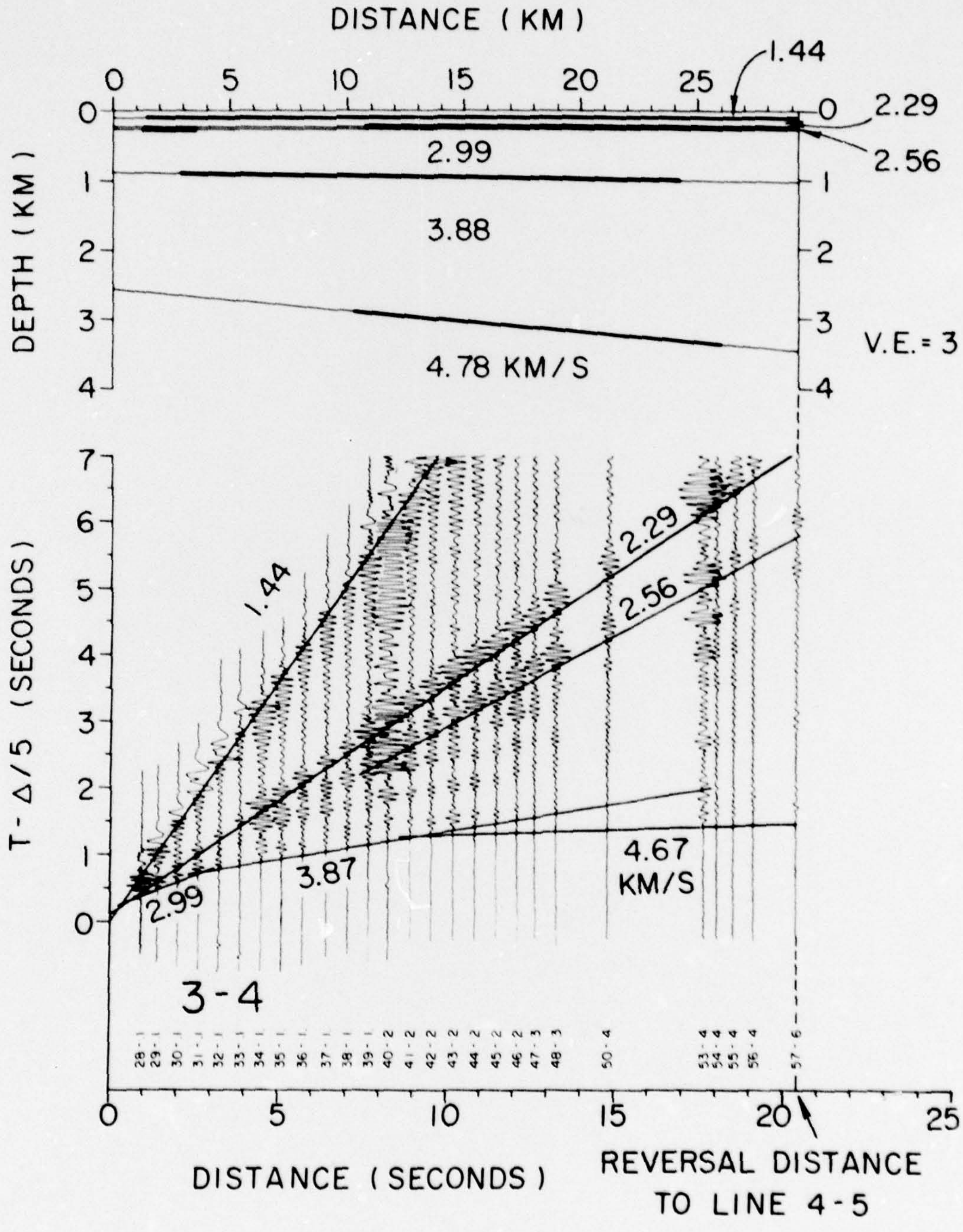


Figure 12. Line 3-4 record section and velocity-depth model interpretation.

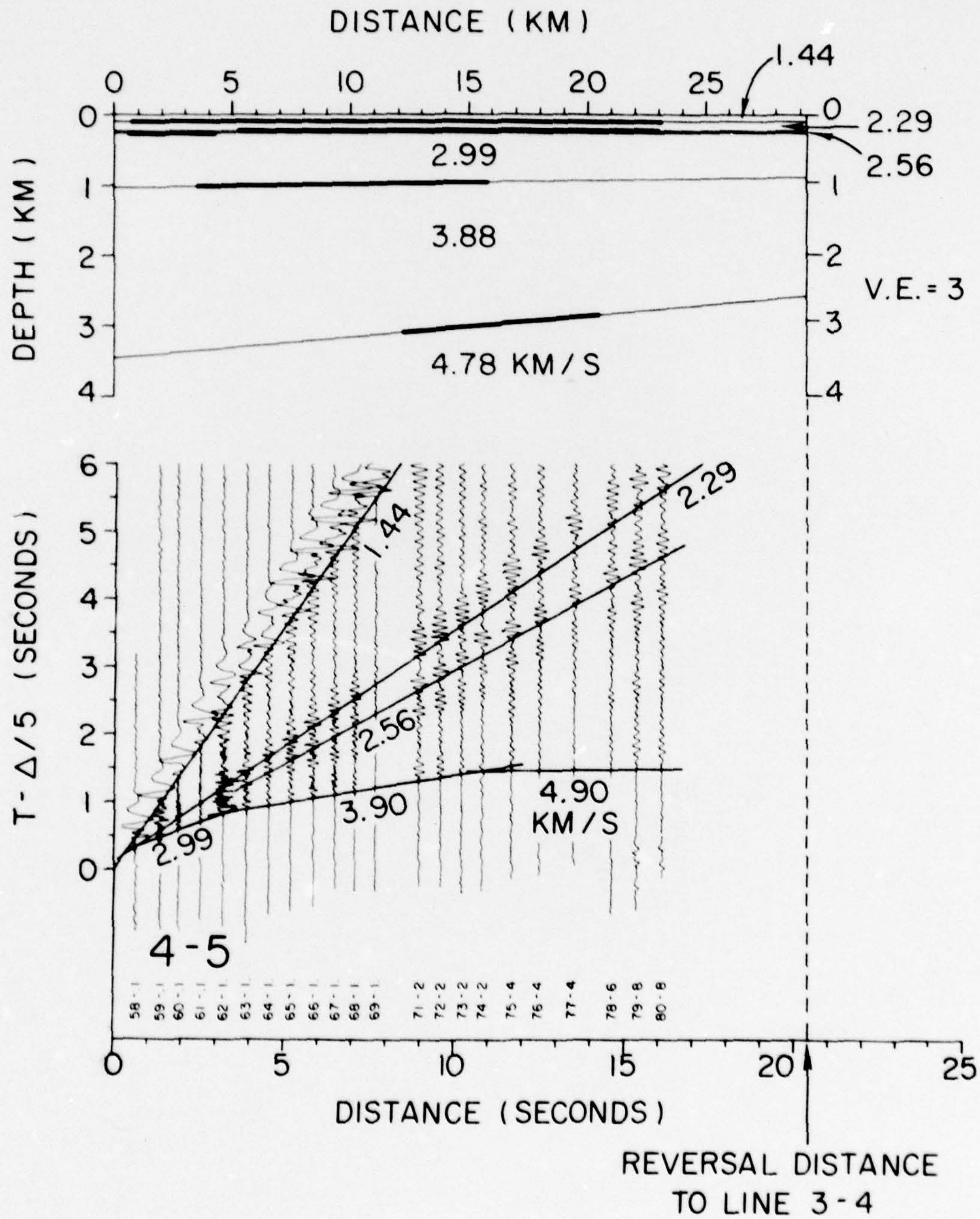


Figure 13. Line 4-5 record section and velocity-depth model interpretation.

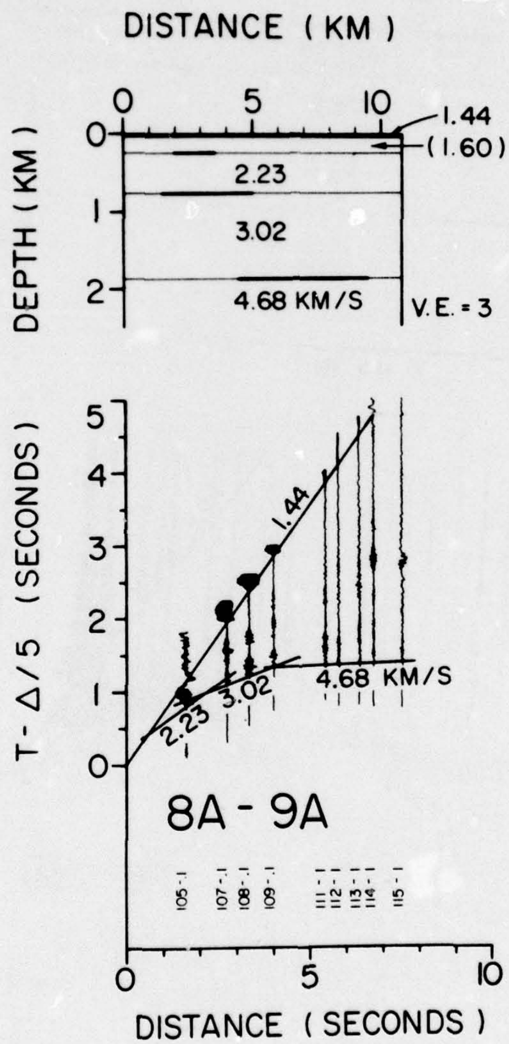


Figure 14. Line 8A-9A record section and velocity-depth model interpretation.

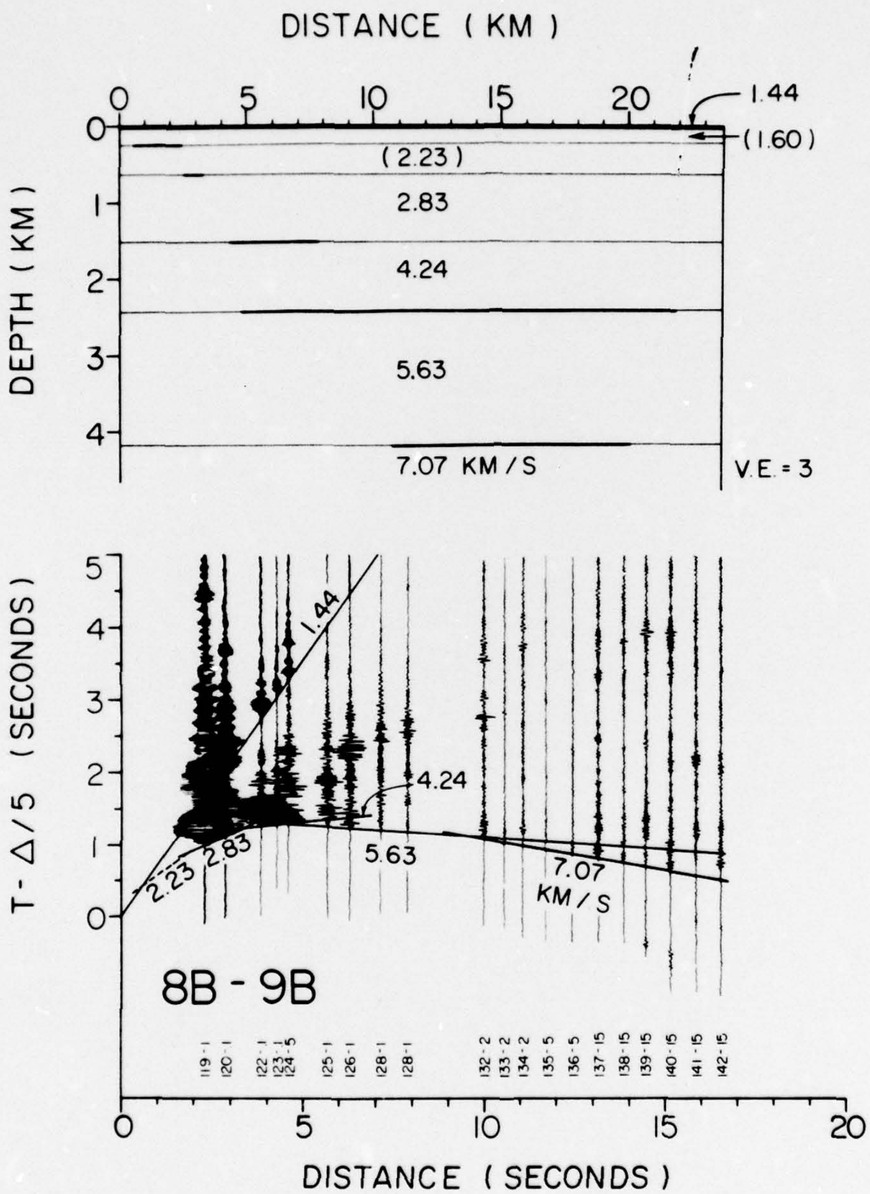


Figure 15. Line 8B-9B record section and velocity-depth model interpretation.

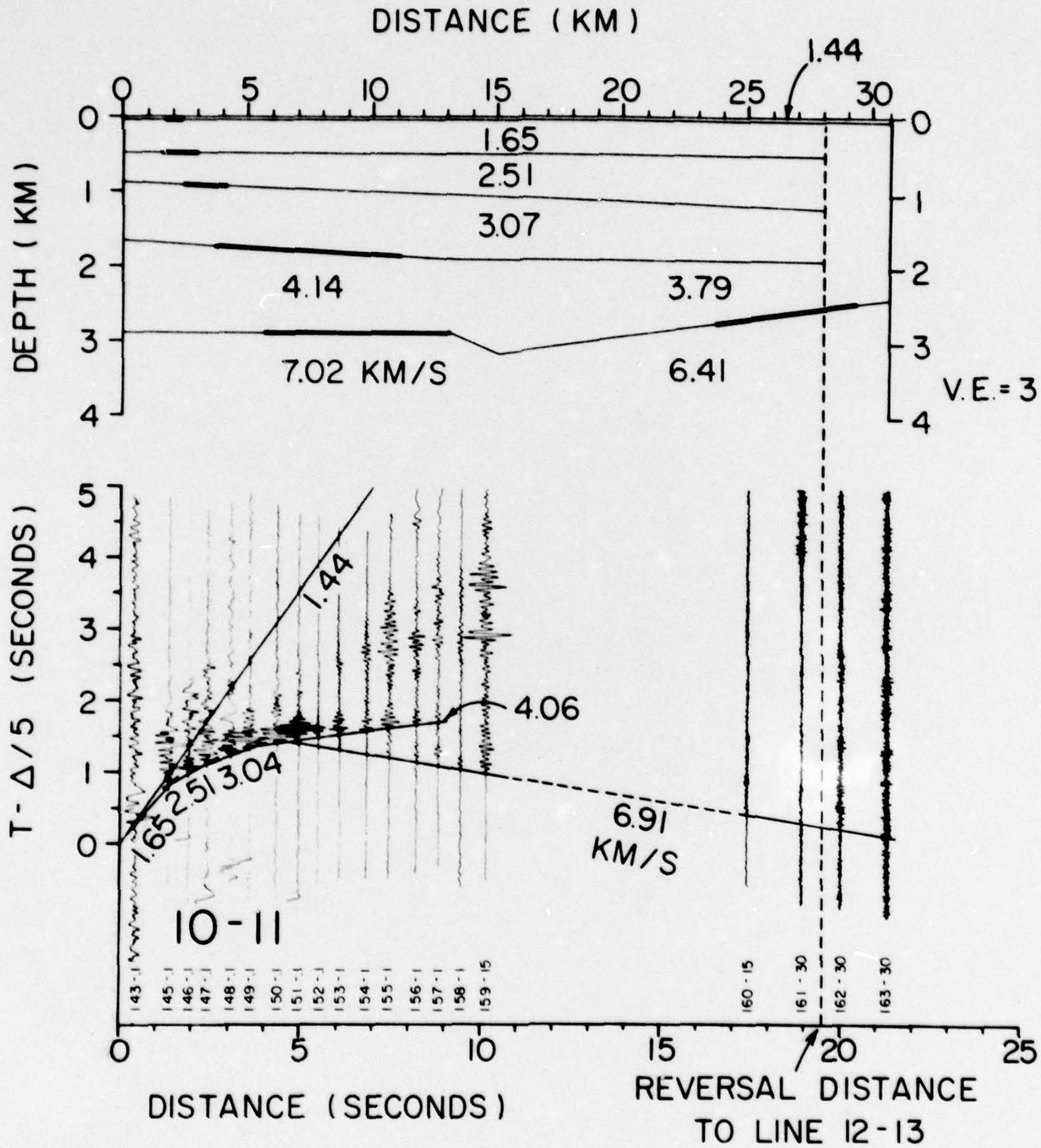


Figure 16. Line 10-11 record section and velocity-depth model interpretation.

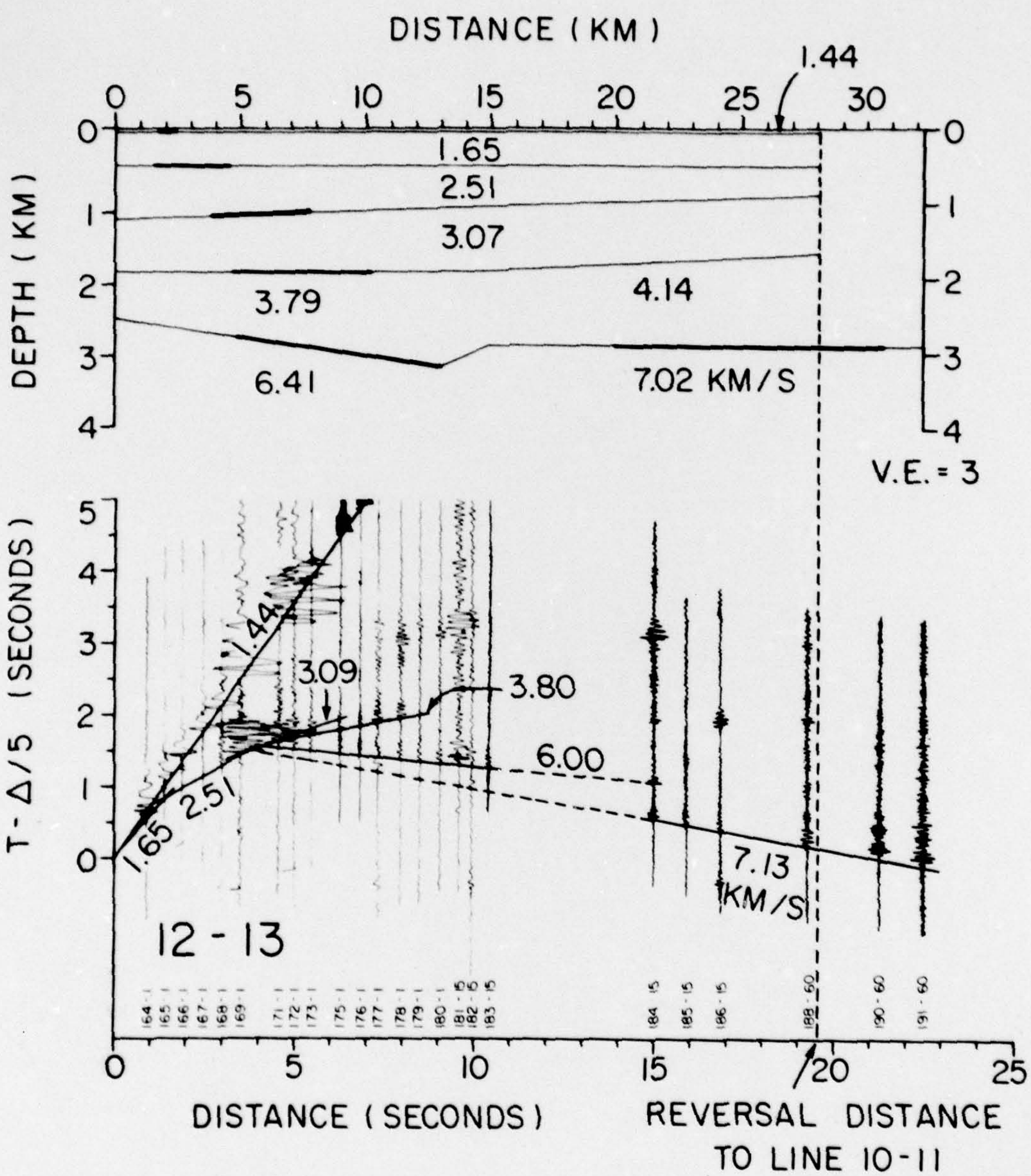


Figure 17. Line 12-13 record section and velocity-depth model interpretation.

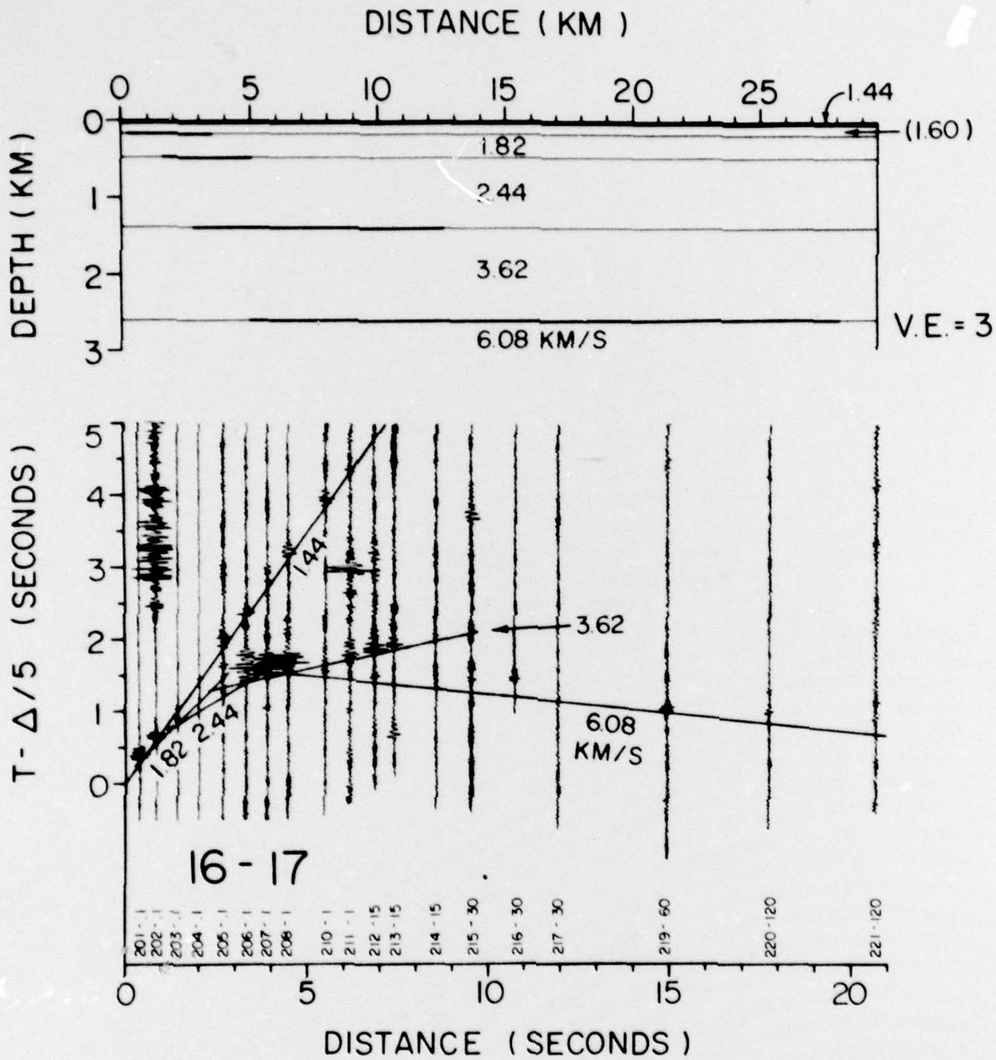


Figure 18. Line 16-17 record section and velocity-depth model interpretation.

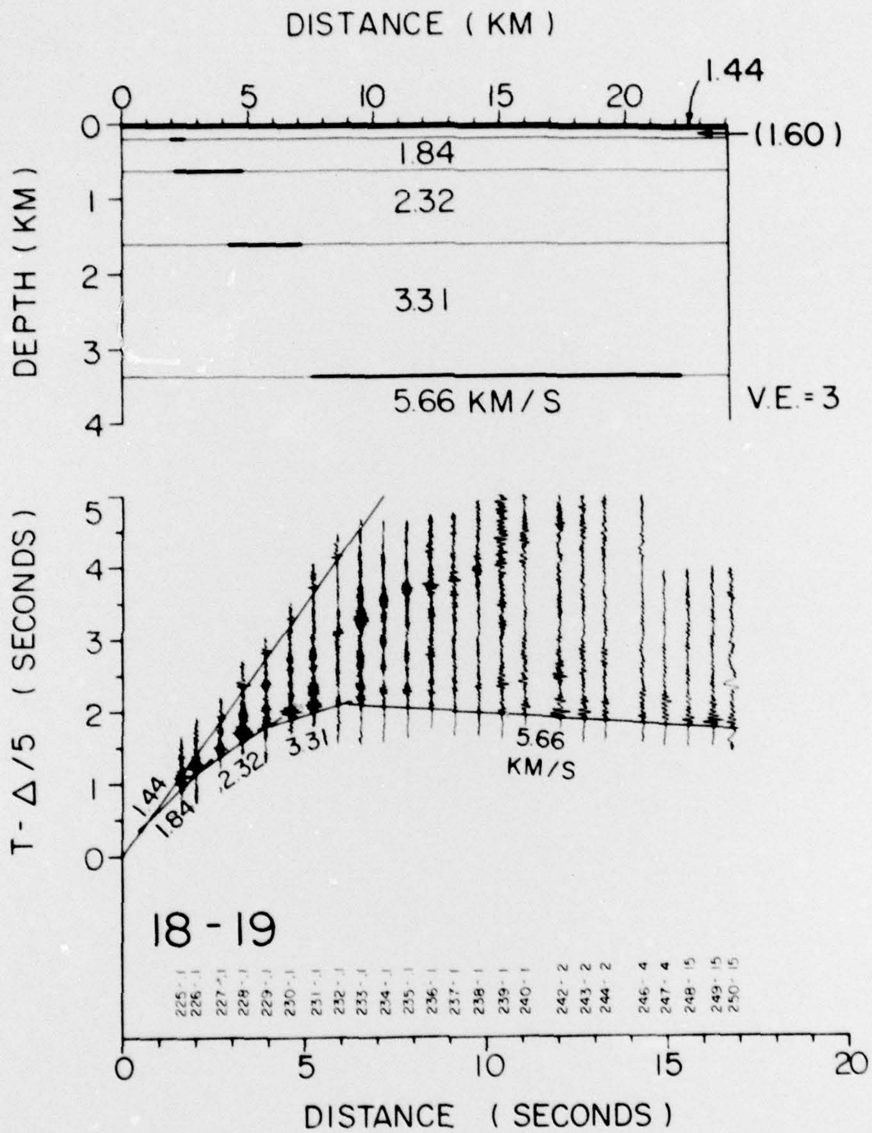


Figure 19. Line 18-19 record section and velocity-depth model interpretation.

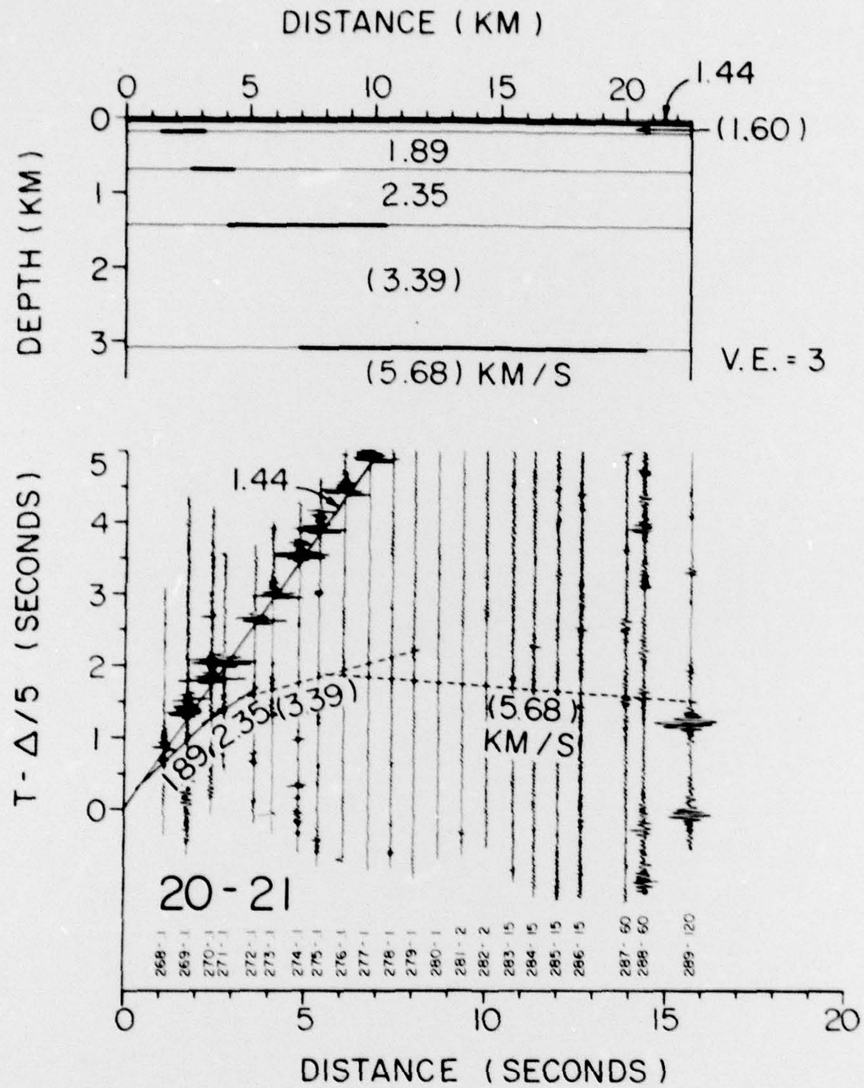


Figure 20. Line 20-21 record section and velocity-depth model interpretation.

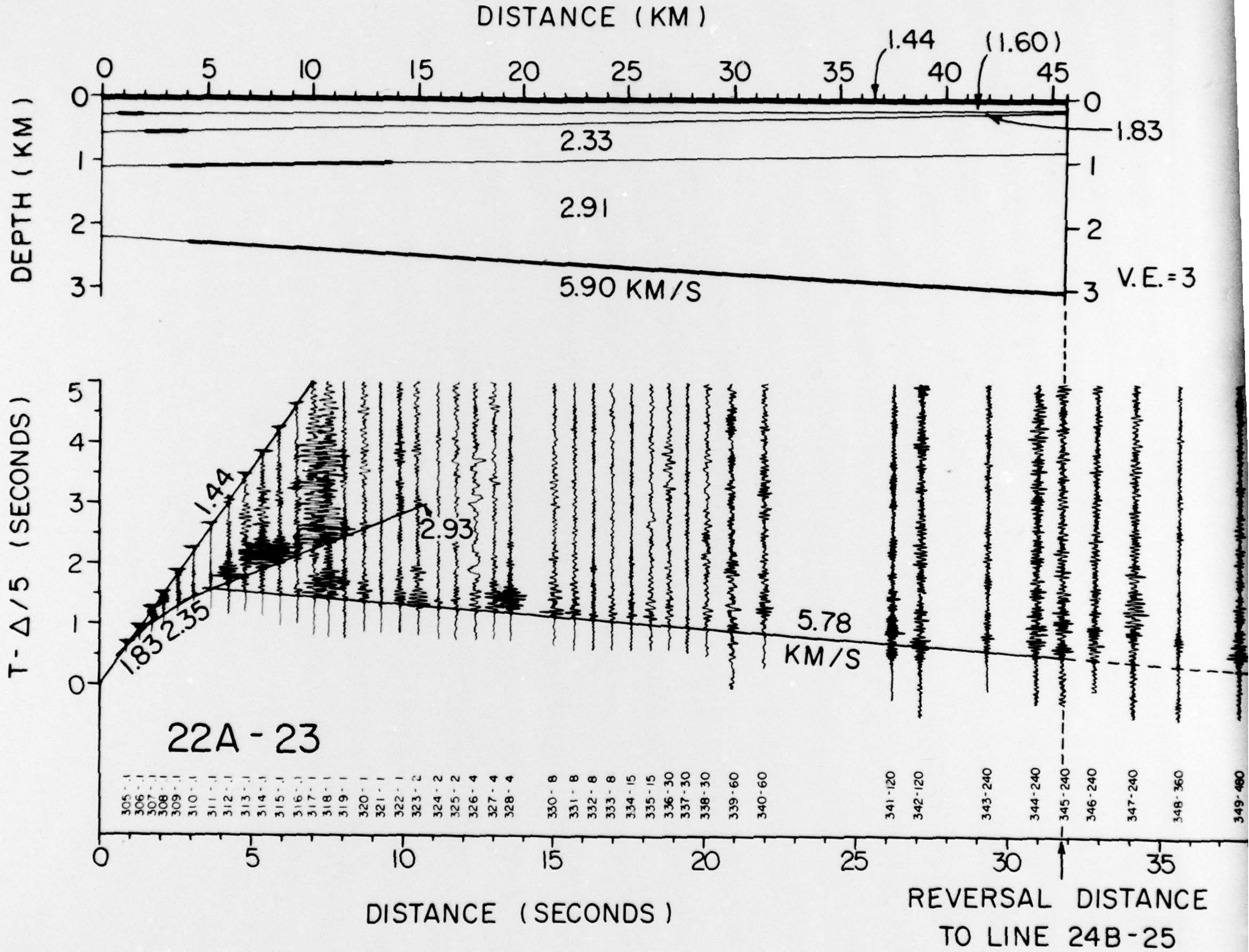
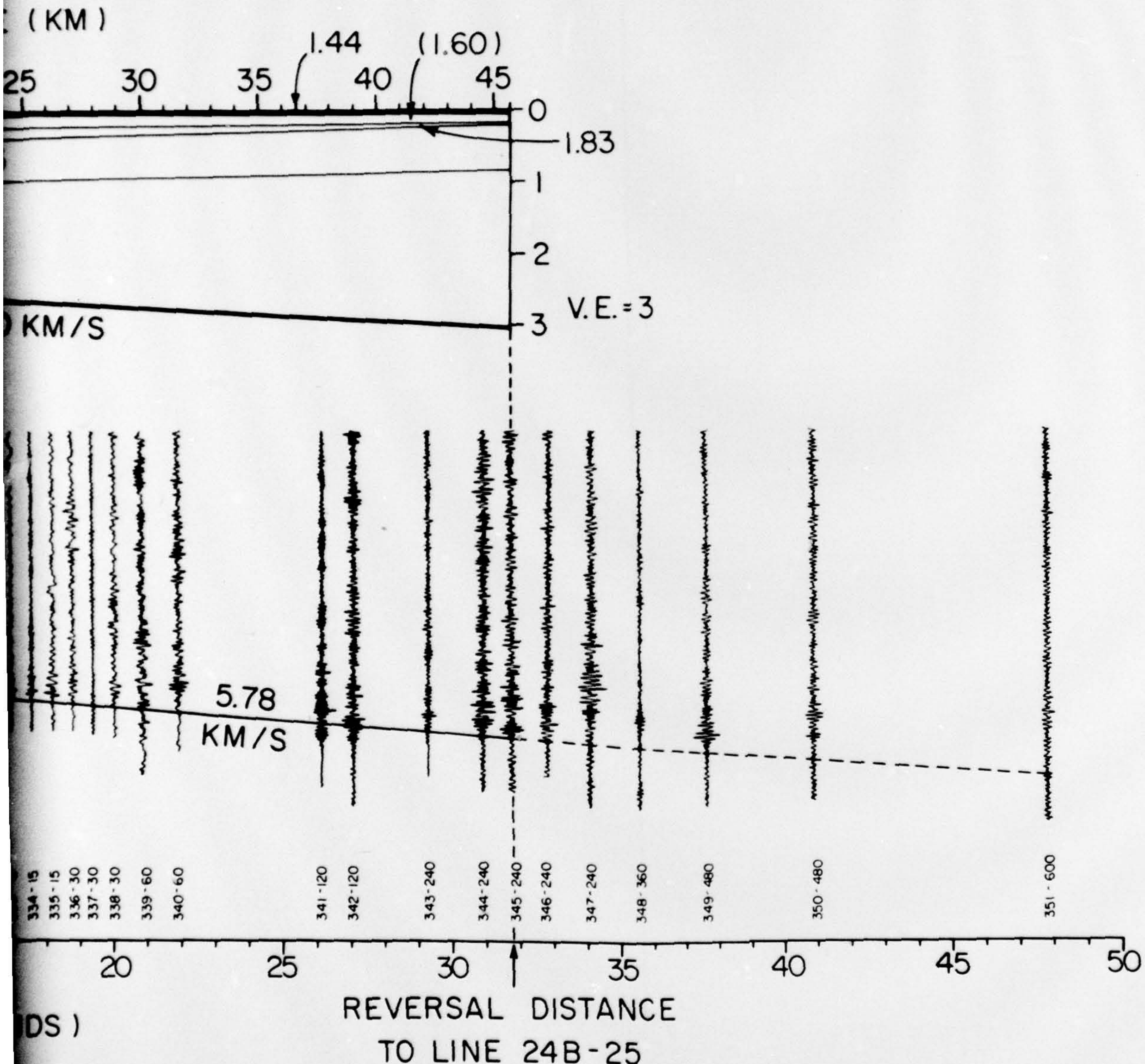


Figure 21. Line 22A-23 record section and velocity-depth model interpretation.



velocity-depth model interpretation.

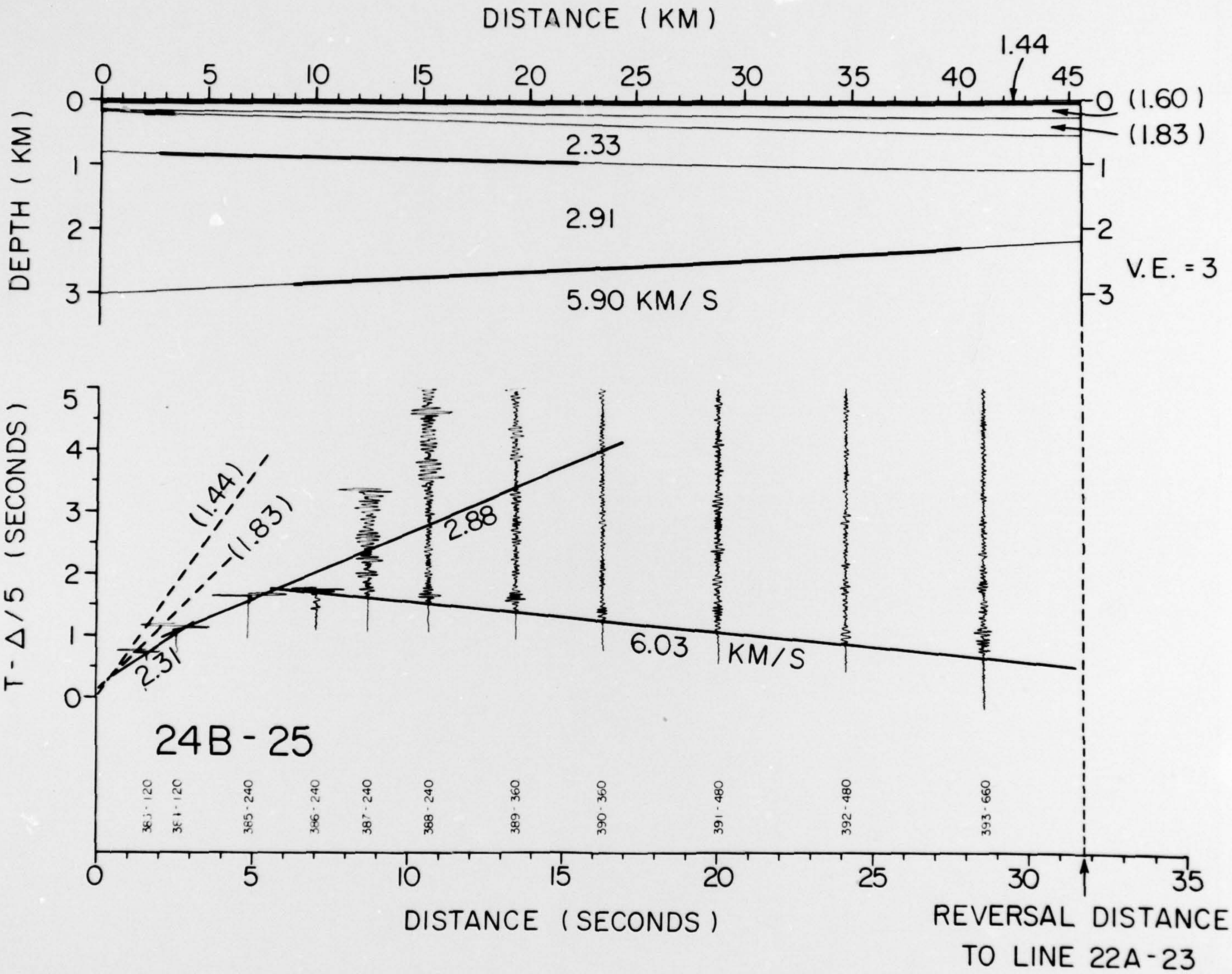


Figure 22. Line 24B-25 record section and velocity-depth model interpretation.

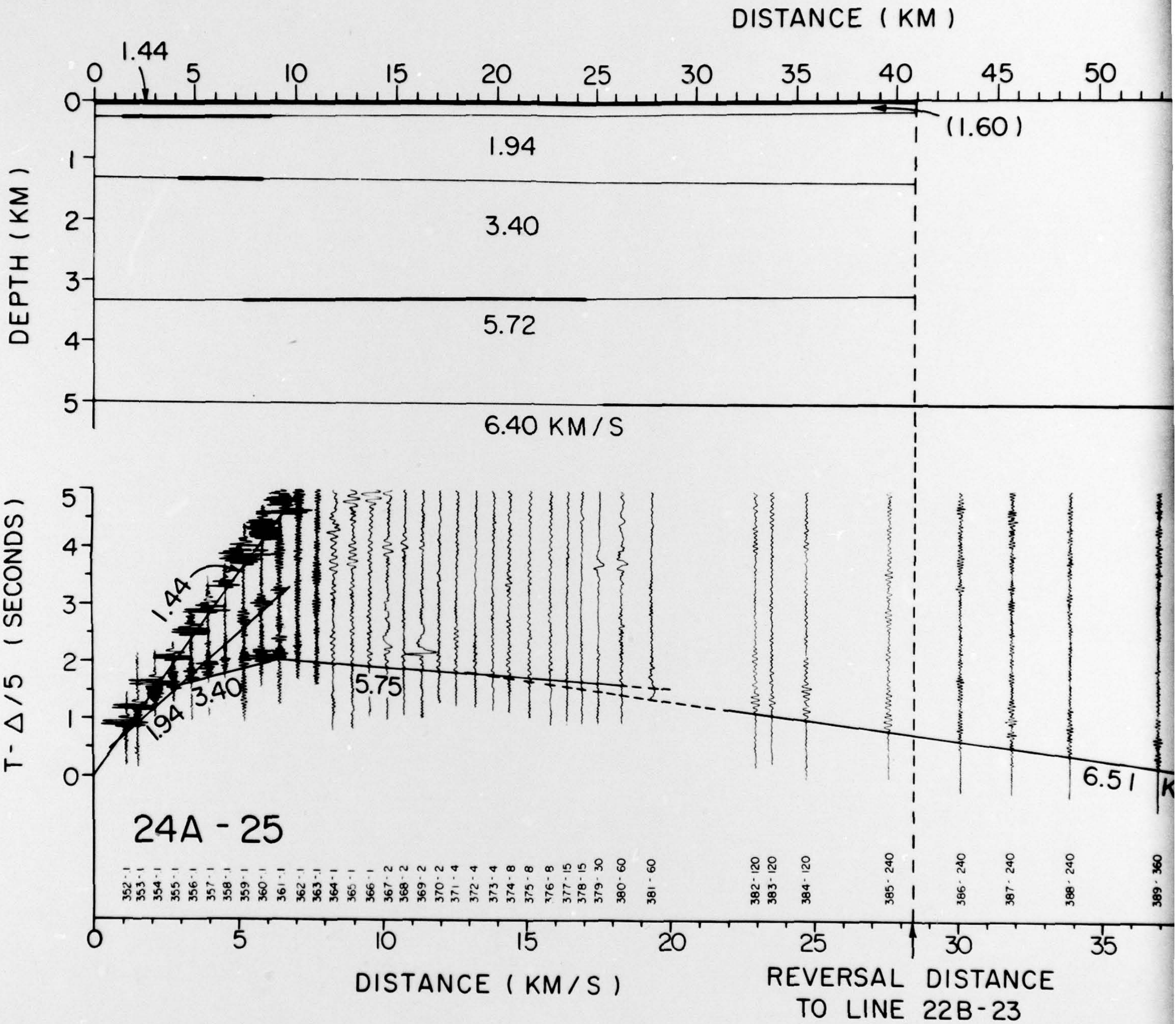
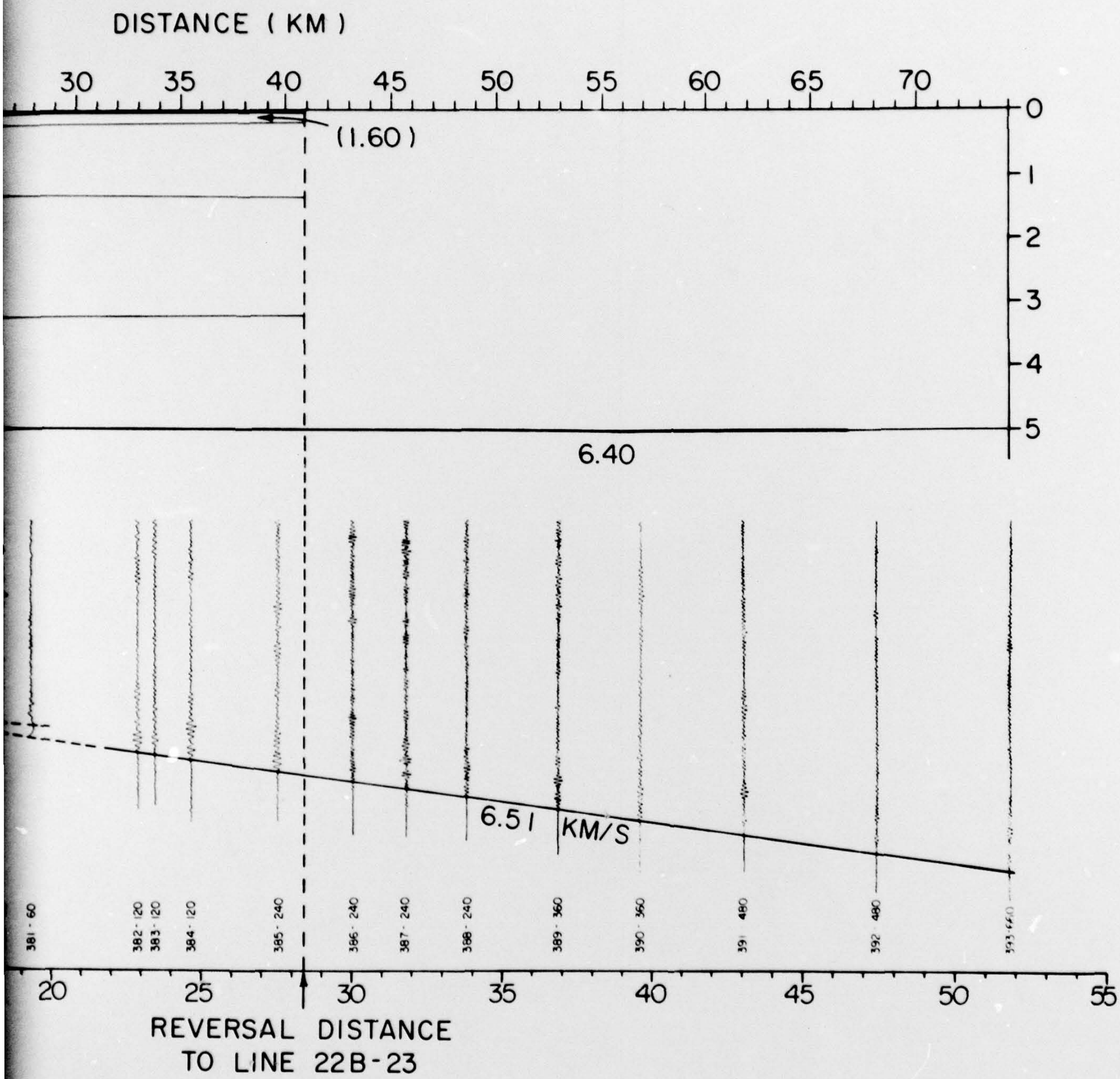


Figure 23. Line 24A-25 record section and velocity-depth model interpretation.



locity-depth model interpretation.

2

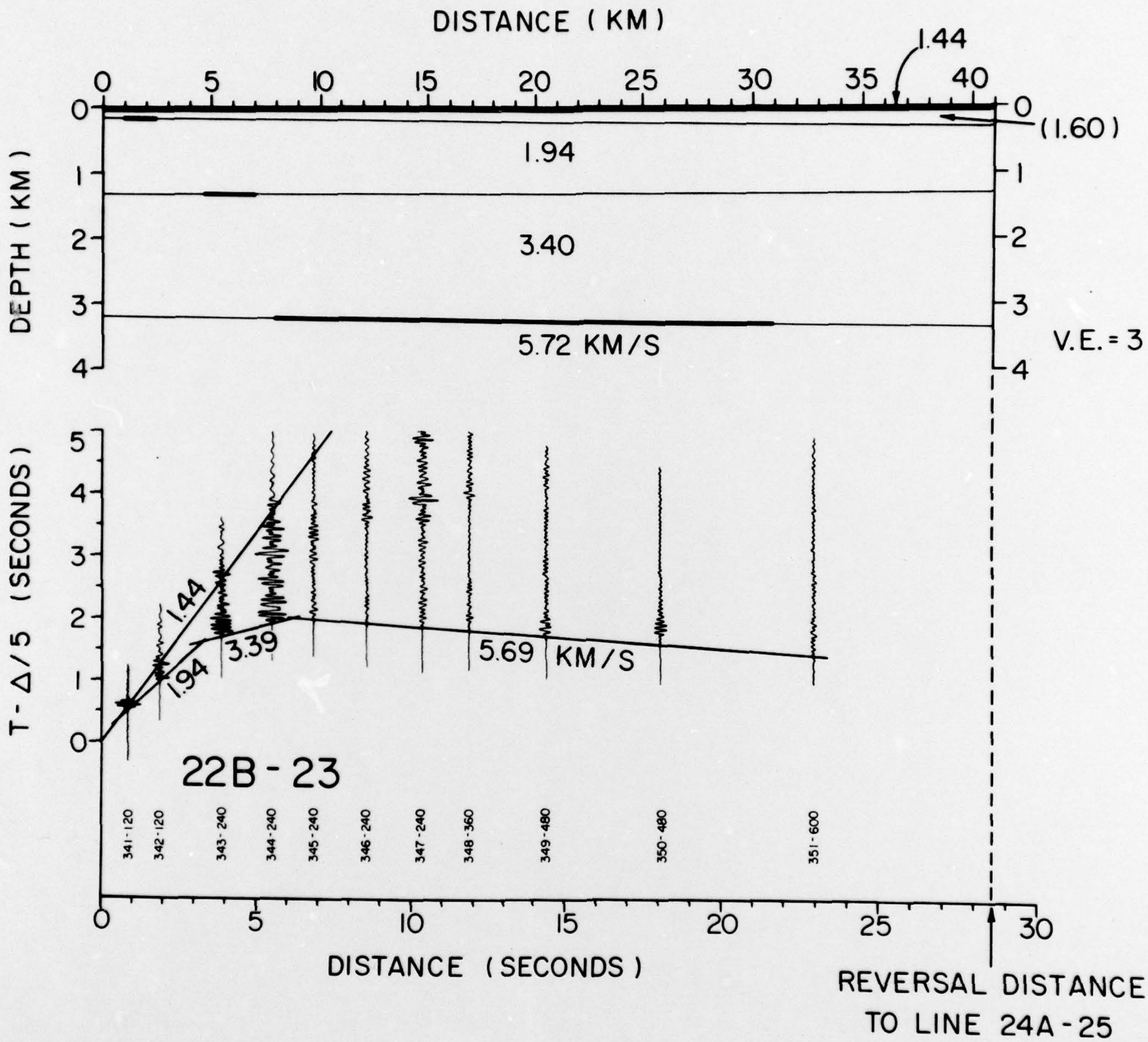


Figure 24. Line 22B-23 record section and velocity-depth model interpretation.

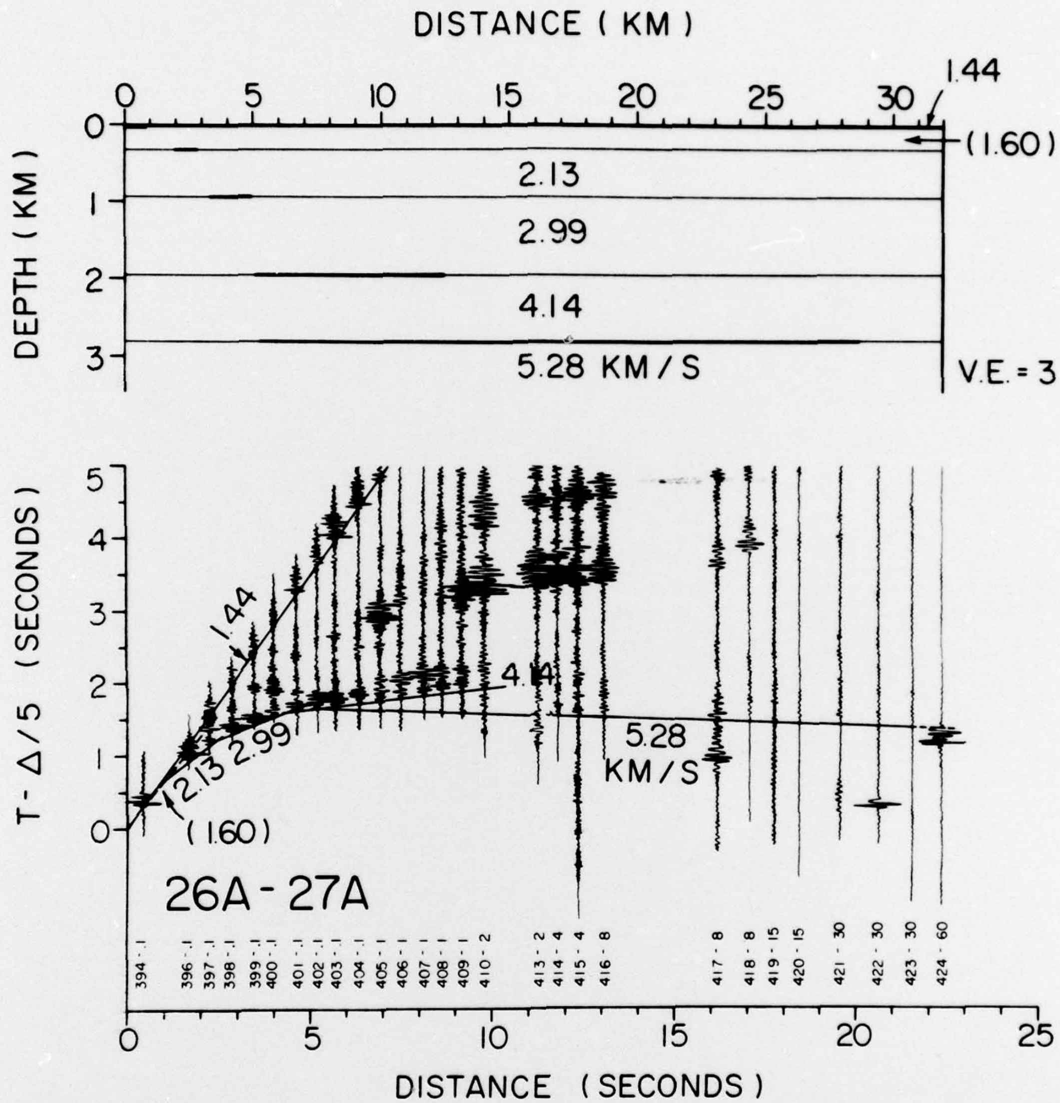


Figure 25. Line 26A-27A record section and velocity-depth model interpretation.

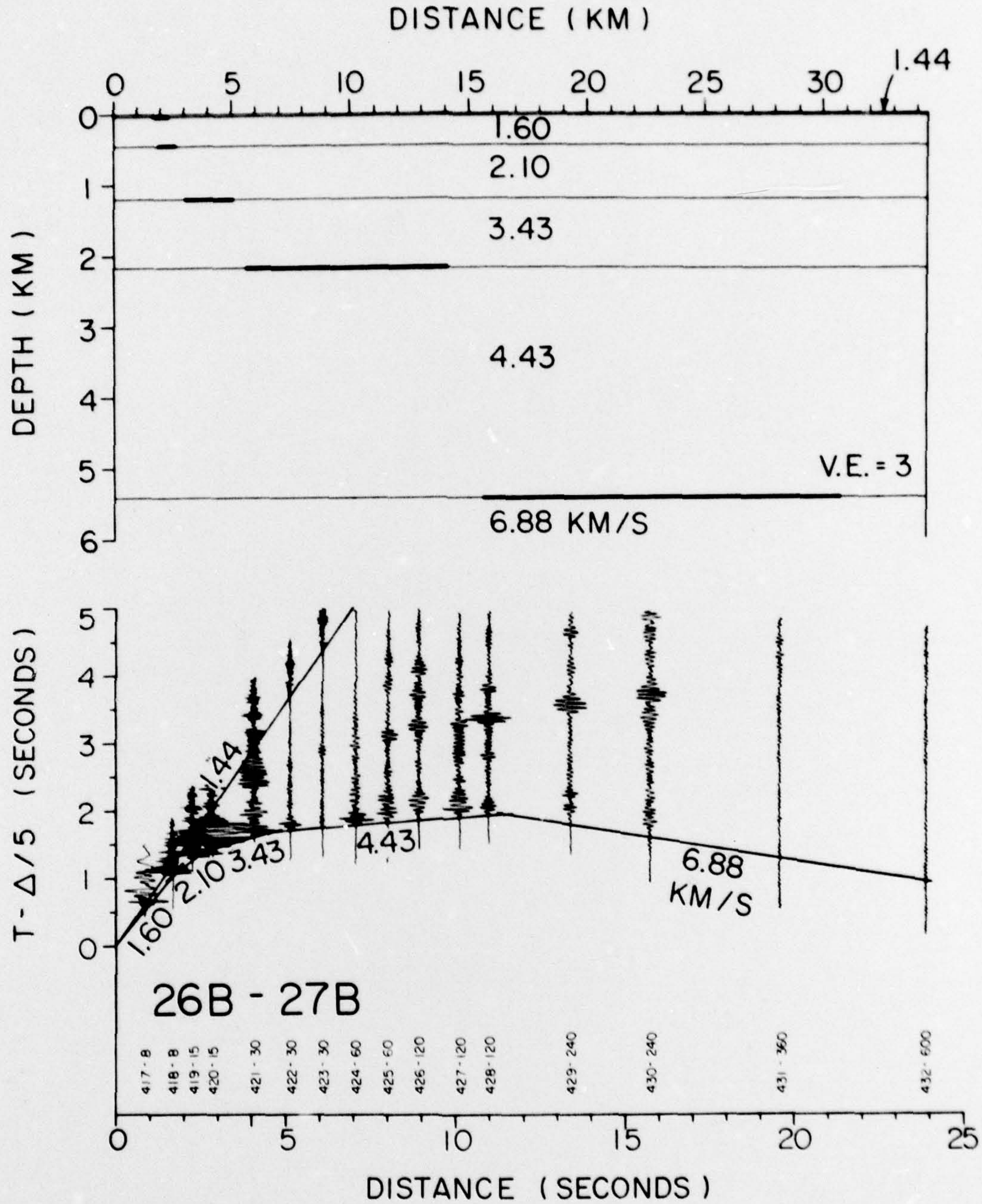


Figure 26. Line 26B-27B record section and velocity-depth model interpretation.

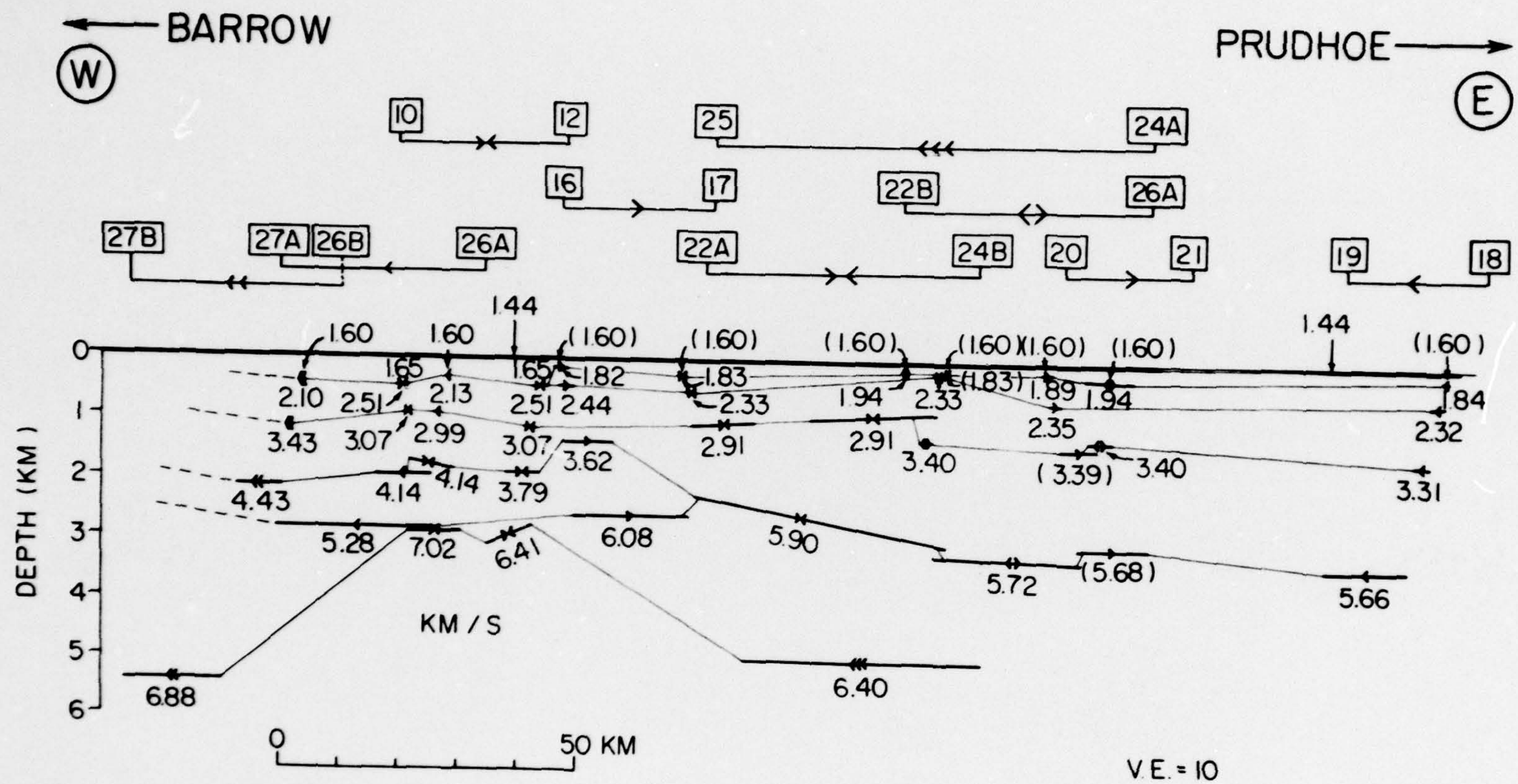


Figure 27. East-west velocity-depth section summarizing the subsurface velocity and depth information calculated from the refraction data.

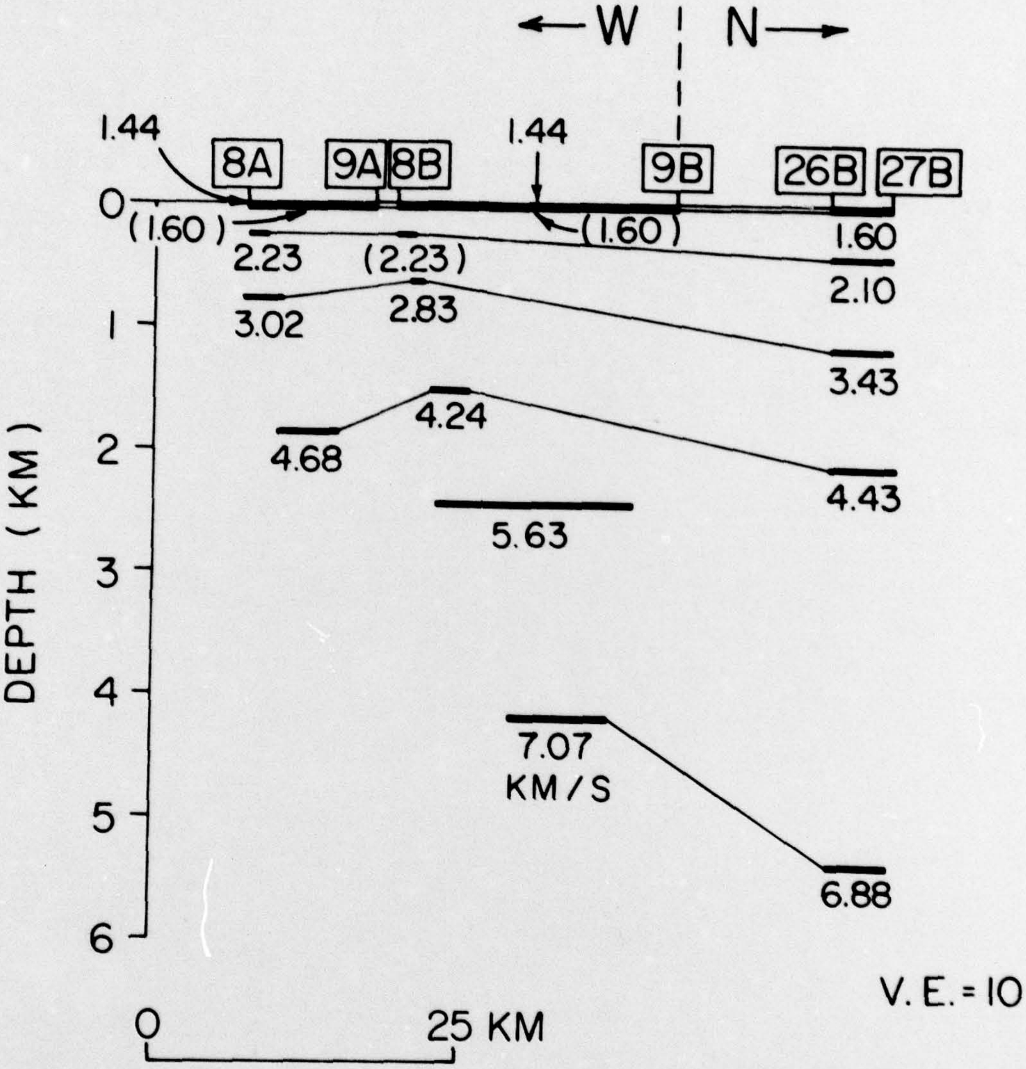


Figure 28. Velocity-depth section north of Smith Bay.

REFERENCES

Adachi, R., 1954. Fundamental relations on the seismic prospecting. Kumamoto Journal of Science, Series A, 2: 18-23.

Bée, M., 1979. Marine seismic refraction study between Cape Simpson and Prudhoe Bay, Alaska. Master Thesis, Oregon State University, Corvallis, Oregon.